User's Manual

ADMAG SE

Models SE100MJ/NJ and SE200MJ/NJ Integral Type Magnetic Flowmeter

IM 1E10B0-01E

YOKOGAWA
Yokogawa Electric Corporation

IM 1E10B0-01E
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1. INTRODUCTION

This instrument has been already adjusted at the factory before shipment.

To ensure correct use of the instrument, please read this manual thoroughly and fully understand how to operate the instrument before operating it.

■ Regarding This Manual

- This manual should be passed on to the end user.
- Before use, read this manual thoroughly to comprehend its contents.
- The contents of this manual may be changed without prior notice.
- All rights reserved. No part of this manual may be reproduced in any form without Yokogawa's written permission.
- Yokogawa makes no warranty of any kind with regard to this material, including, but not limited to, implied warranties of merchantability and suitability for a particular purpose.
- All reasonable effort has been made to ensure the accuracy of the contents of this manual. However, if any errors are found, please inform Yokogawa.
- Yokogawa assumes no responsibilities for this product except as stated in the warranty.
- If the customer or any third party is harmed by the use of this product, Yokogawa assumes no responsibility for any such harm owing to any defects in the product which were not predictable, or for any indirect damages.

■ Safety Precautions

- The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS given elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. YOKOGAWA Electric Corporation assumes no liability for the customer's failure to comply with these requirements. If this instrument is used in a manner not specified in this manual, the protection provided by this instrument may be impaired.

The following safety symbol marks are used in this manual and instrument;

WARNING

A WARNING sign denotes a hazard. It calls attention to procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death of personnel.

CAUTION

A CAUTION sign denotes a hazard. It calls attention to procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

IMPORTANT

A IMPORTANT sign denotes an attention to avoid leading to damage to instrument or system failure.

NOTE

A NOTE sign denotes a information for essential understanding of the operation and features.

⏚ Protective grounding terminal.

⏚ Function grounding terminal. This terminal should not be used as a "Protective grounding terminal".

~ Alternating current.

⎓ Direct current.

■ Warranty

- The guaranteed term of this instrument is described in the quotation. We repair the damages that occurred during the guaranteed term for free.
- Please contact with our sales office when this instrument is damaged.
- If the instrument has trouble, please inform us model code, serial number, and concrete substances or situations. It is preferable to be attached a outline or data.
- We decide after the examination if free repair is available or not.
- Please consent to the followings for causes of damages that are not available as free repair, even if it occured during the guaranteed term.

A: Unsuitable or insufficient maintenance by the customer.
B: The handling, using, or storage that ignore the design and specifications of the instrument.
C: Unsuitable location that ignore the description in this manual.
D: Remaking or repair by a person except whom we entrust.
E: Unsuitable removing after delivered.
F: A natural disaster (ex. a fire, earthquake, storm and flood, thunderbolt) and external causes.

■ For Safety Using

For safety using the instrument, please give attention mentioned below.

⚠ WARNING

(1) Installation
- The instrument must be installed by expert engineer or skilled personnel. The procedures described about INSTALLATION are not permitted for operators.
- The Magnetic Flow Tube is a heavy instrument. Please give attention to prevent that persons are injured by carrying or installing. It is preferable for carrying the instrument to use a cart and be done by two or more persons.
- In case of high process temperature, care should be taken not to burn yourself because the surface of body and case reach a high temperature.
- When removing the instrument from hazardous processes, avoid contact with the fluid and the interior of the flow tube.
- All installation shall comply with local installation requirement and local electrical code.

(2) Wiring
- The instrument must be installed by expert engineer or skilled personnel. The procedures described about WIRING are not permitted for operators.
- Please confirm voltages between the power supply and the instrument before connecting the power cables. And also, please confirm that the cables are not powered before connecting.
- The protective grounding must be connected to the terminal ⏚ in order to avoid personal shock hazard.

(3) Operation
- Wait 10 min. after power is turned off, before opening the covers.

(4) Maintenance
- Please do not carry out except being written to a maintenance descriptions. When these procedures are needed, please contact to nearest YOKOGAWA office.
- Care should be taken to prevent the build up of drift, dust or other material on the display glass and data plate. In case of its maintenance, soft and dry cloth is used.

(5) Explosion Protected Type Instrument
- For explosion proof type instrument, the description in Chapter 12 “EXPLOSION PROTECTED TYPE INSTRUMENT” is prior to the other description in this user's manual.
- Only trained persons use this instrument in the industiral location.
- The protective grounding ⏚ must be connected to a suitable IS grounding system.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(6) The Instrument in Compliance with PED
- For the instrument in compliance with PED, the description in Chapter 13 “PRESSURE EQUIPMENT DIRECTIVE” is prior to the other description in this User’s Manual.

2. HANDLING PRECAUTIONS

This instrument has been already tested thoroughly at the factory. When the instrument is delivered, please check externals and make sure that no damage occurred during transportation.

In this chapter, handling precautions are described. Please read this chapter thoroughly at first. And please refer to the relative matter about other ones.

If you have any problems or questions, please make contact with Yokogawa sales office.

2.1 Checking Model and Specifications

The model and specifications are shown on the Data Plate. Please confirm the specifications between the instrument that was delivered and the purchase order (refer to the chapter 5. Outline).

Please let us know Model and Serial No. when making contact with Yokogawa sales office.

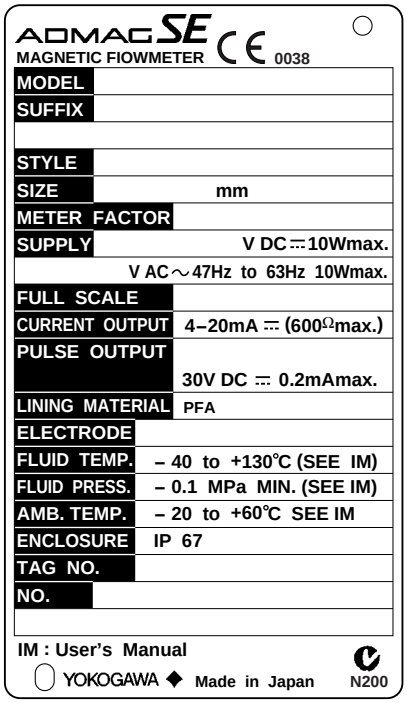

Figure 2.1 Data Plate

2.2 Accessories

When the instrument is delivered, please make sure that the following accessories are in the package.

- Centering device 1-set (for wafer type)
- Hexagonal wrench 1-piece (for special screw of terminal cover)
- Data Sheet 1-sheet
- Unit Labels 1-sheet
- Plug 1-piece (only for DC power supply version)

2.3 Storage Precautions

In case the instrument is expected to be stored over a long term, please give attention to the followings;

- The instrument should be stored in its original packing condition.
- The storage location should be selected according to the following conditions:
  1) The location where it is not exposed to rain or water.
  2) The location where there is few vibration or shock.
  3) Temperature and humidity should be:
     Temperature: –40 to 70˚C (–40 to 158˚F)
     Humidity: 5 to 80% RH (no condensation)
     Preferable ambient temperature and humidity are 25˚C(77˚F) and about 65% RH.

2.4 Installation Location Precautions

Please select the installation location considering the following items to ensure long term stable operation of the flow tube.

- Ambient Temperature:
  Please avoid to install the instrument at the location where temperature changes continuously. If the location receives radiant heat from the plant, provide heat insulation or improve ventilation.
- Atmospheric Condition:
  Please avoid to install the instrument in an corrosive atmosphere. In case of installing in the corrosive atmosphere, please keep ventilating sufficiently and prevent rain from entering the conduit.
- Vibration or shock:
  Please avoid to install the instrument at the location where there is heavy vibration or shock.

2.5 Cleaning Precautions

Care should be taken to prevent the buildup of dirt, dust or other material on the display glass. Such buildup may interfere with the operation of programming keys.

2.6 Converter Reorientation Precautions

Please do not change the converter orientation at the customer's site. If the converter reorientation is required, please contact Yokogawa office or service center.

3. INSTALLATION

WARNING

This instrument must be installed by expert engineer or skilled personnel. The procedures described in this chapter are not permitted for operators.

3.1 Piping Design Precautions

IMPORTANT

Please design the correct piping referring to the followings to prevent damage for flow tube and to keep correct measuring.

(1) Location

IMPORTANT

Please install the flow tube to the location where it is not exposed to direct sunlight and ambient temperature is –20 to + 60°C (–4 to 140°F)*.

* The minimum temperature is –10°C (14°F) in case of the 40mm or lager sizes with the carbon steel flange connection or wafer connection.

(2) Noise Rejection

IMPORTANT

The instrument should be installed away from large electrical motors, transformers and other power sources in order to avoid interference with the measurement.

(3) Length of Straight Run

To keep accurate measuring, JIS B7554 “Electro Magnetic Flow Tubes” explains about upstream piping condition of Magnetic Flowmeters.

We recommend to our customers about the piping conditions shown in Figure 3.1.1 based on JIS B7554 and our piping condition test data.

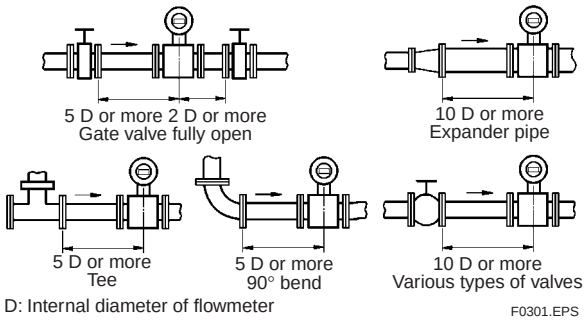

Figure 3.1.1 Minimum Length of Required Straight Run

NOTE

1. Nothing must be inserted or installed in the metering pipe that may interfere with the magnetic field, induced signal voltages, and flow velocity distribution.
2. These straight runs may not be required on the downstream side of flowmeter. However, if the downstream valve or other fittings cause channeling on the upstream side, provide a straight run of 2 D to 3 D on the downstream side.

(4) Liquid Conductivity

IMPORTANT

Please avoid to install the flow tube at location where liquid conductivity is likely to be non-uniform. Because it is possible to have bad influences to the flow indication by non-uniform conductivity when a chemical liquid is injected from upstream side close to the flow tube. When this occurs, it is recommended that chemical application ports are installed on the downstream side of the flow tube. In case chemicals must be added upstream side, please keep the pipe length enough so that liquid is properly mixed.

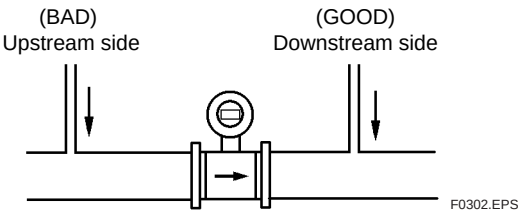

Figure 3.1.2 Chemical Injection

(5) Liquid Sealing Compound

IMPORTANT

Please give attention in using Liquid Sealing Compound to the piping, because it brings bad influences to measurement by flowing out and cover the surfaces of electrode and earth-ring.

(6) Service Area

Please select the location where there is enough area to service installing, wiring, overhaul, etc.

(7) Bypass Line

It is recommended to install the Bypass Line to facilitate maintenance and zero adjustment.

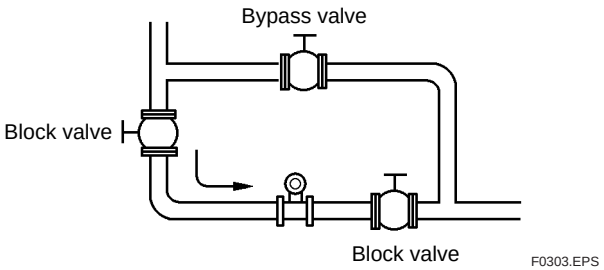

Figure 3.1.3 Bypass Line

(8) Supporting the Flowmeter

CAUTION

Please avoid to support only the flowmeter, but fix pipes at first and support the flowmeter by pipes to protect the flow tube from forces caused by vibration, shock, expansion and contraction through piping.

(9) Piping Condition

IMPORTANT

The piping should be designed so that a full pipe is maintained at all times to prevent loss of signal and erroneous readings.

Please design the piping that a fluid is always filled in the pipes. The Vertical Mounting is effective for fluids that is easily separate or slurry settles within pipes.

In this case, please flow a fluid from bottom to up.

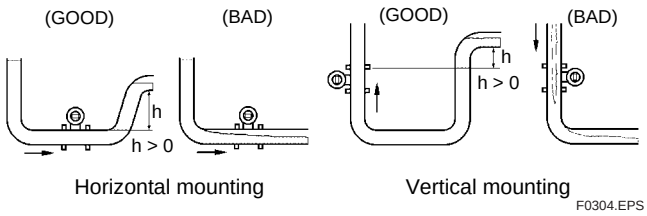

Figure 3.1.4 Filling the Pipe with Liquid

(10) No Air Bubbles

IMPORTANT

Please give attention to prevent bad influences or measuring errors from air bubbles that gathers inside measuring pipes.

In case the fluid includes air bubbles, please design the piping that prevent to gather air bubbles. In case valves are installed upstream of the flow tube, it is possible that a valve causes air bubbles, please install the flowmeter upstream side of a valve.

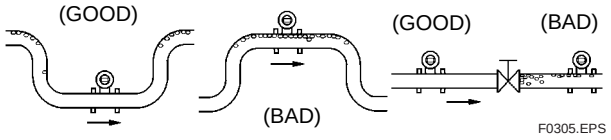

Figure 3.1.5 Avoiding Air Bubbles

(11) Mounting Direction

IMPORTANT

When the electrodes are vertical to ground, the electrode is covered with air bubbles at upper side or slurry at downside, and it may cause the measuring errors.
Please be sure to mount the terminal box upper side of piping to prevent water penetration into terminal box.

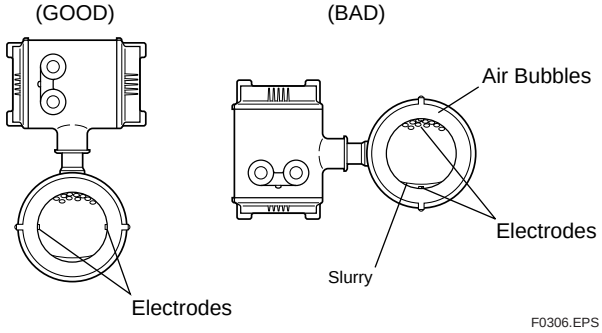

Figure 3.1.6 Mounting Direction

(12) Grounding

IMPORTANT

Improper grounding can have an adverse affect on the flow measurement. Please ensure that the instrument is properly grounded.

The electromotive force of the magnetic flow tube is minute and it is easy to be affected by noise. And also that reference electric potential is the same as the measuring fluid potential. Therefore, the reference electric potential (terminal potential) of the Flow Tube and the Converter/Amplifier also need to be the same as the measuring fluid. And moreover, that the potential must be the same with ground.

Please be sure to ground according to Figure 3.1.7.

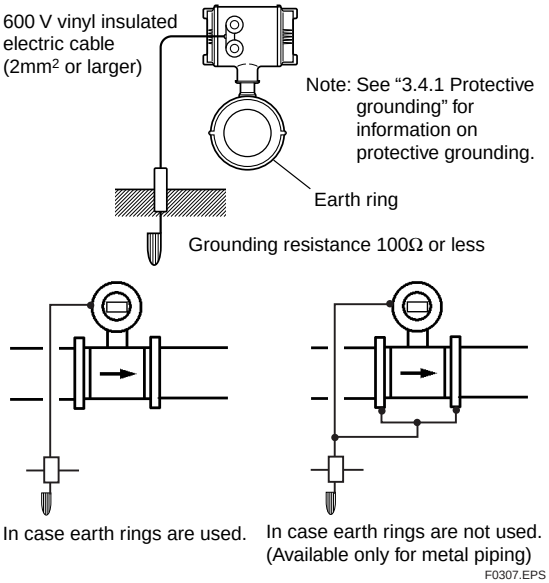

Figure 3.1.7 Grounding

3.2 Handling Precautions

WARNING

The Magnetic Flowmeter is a heavy instrument. Please be careful to prevent persons from injuring when it is handled.

3.2.1 General Precautions

(1) Precaution for Carrying

The Magnetic Flowmeter is packed tightly. When it is unpacked, please give attention to prevent damages to the flowmeter. And to prevent the accident during carry to the installing location, please carry it near the location keeping packed as it delivered.

CAUTION

In case the Magnetic Flow Tube without eye-bolt lifts up, please refer to Figure 3.2.1. Please never lift up by using a bar through the flow tube. It damages liner severely.

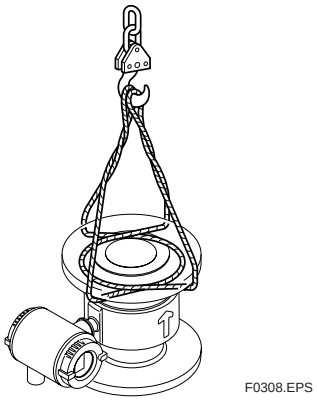

Figure 3.2.1 Vertical Lifting Sling Rigging Method

(2) Precaution for Shock

CAUTION

Care should be taken not to drop the flow tube or subject it to excessive shock. This may lead to liner damage which will cause inaccurate readings.

(3) Flange Protection Covers

IMPORTANT

Please keep the protection cover (ex. corrugated paper or anything possible to protect) attached with flange except when mounting to the pipe.

(4) Terminal Box Cover

IMPORTANT

Please never leave the terminal box cover open until wiring to prevent insulation deterioration.

NOTE

The terminal box cover is locked by special screw. In case of opening the terminal box cover, please use the Hexagonal Wrench attached.

CAUTION

Be sure to lock the cover with the special screw using the Hexagonal Wrench attached after tightening the terminal box cover.

(5) Long-term Non-use

IMPORTANT

It is not preferable to leave the flowmeter for long term non-use after installation.
In case the flow tube is compelled to do that, please take care of the flowmeter by the followings.

- Confirmation of Sealing Condition for the Flowmeter.
  Please confirm the sealing conditions of the terminal box screw and wiring ports.
  In case of the Conduit Piping, please provide the drain plugs or waterproof glands to it to prevent that moisture or water penetrates into the flow tube through the conduit.
- Regular Inspections
  Please inspect the sealing condition (as above mentioned) and inside of the terminal box. And when it is suspect that water penetration into the inside flow tube (ex. rain fall), please inspect when it happened.

3.2.2 Flowmeter Piping

CAUTION

Mis-aligned or slanted piping can lead to leakage and damage to flanges.

- Please correct mis-alignment or slanted piping and improper distance between mounting flanges before install the flowmeter. (Please refer to Figure 3.2.2)
- Inside a pipeline which is newly installed, some foreign substances (such as welding scrap or wood chips) may exist. Please remove them by flushing piping before mounting the flowmeter.

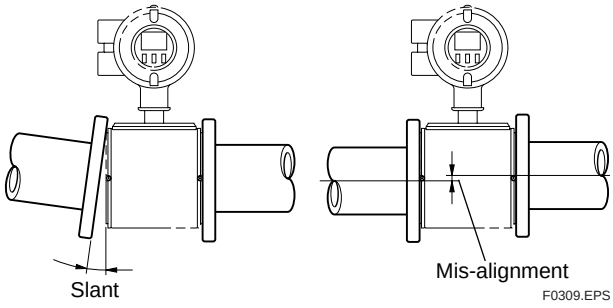

Figure 3.2.2 Slant and Mis-alignment of Flowmeter Piping

3.3 Mounting

3.3.1 Nominal Diameter 15mm (0.5in) to 40mm (1.5in) Wafer Type

IMPORTANT

Please use appropriate bolts and nuts according to process connection. In case stud type of through bolts are used, be sure outside diameter of a shank is smaller than a thread ridge's one. Please use compressed non-asbestos fiber gasket, PTFE gasket or the gasket which has equal elasticity. In case of optional code/FRG, please use rubber gasket or others which has equal elasticity. Be sure the inner diameter of the gasket does not protrude to inner piping. (Refer to Table 3.3.6)

(1) Mounting Direction

Please mount the Magnetic Flowmeter matching the flow direction of the fluid to be measured with the direction of the arrow mark on the flowmeter.

IMPORTANT

If it is impossible to match the direction, please never remodel by changing direction of the terminal box. In case the measuring fluid flows against the arrow direction, please refer to the section 5.3.6 Reversing Flow Direction.

(2) Mounting Centering Devices

To keep concentricity of the Flow Tube with pipes, please mount centering devices on the Mini-Flanges of the Flow Tube. Please give attention to the nominal diameter and flange rating of the centering devices.

(3) Positioning Flow Tube

Please pass two through-bolts to adjacent holes of both flanges and mount the Flow Tube, and pass other through-bolts to other holes. (Refer to Figure 3.3.1) In case stud type of through-bolts are used, position them coming in contact centering devices with thread of bolts.

(4) Tightening Nuts

Please tighten the bolts according to Torque Values in Table 3.3.1. In case of PVC piping, please select optional code /FRG, use rubber gasket and tighten with the torque value in Table 3.3.2.

⚠ CAUTION

As the lining material is Fluorocarbon PFA, it is possible that nuts may loose by its character as time passes. Please tighten the nuts regularly. Please be sure to tighten the bolts following prescribed torque values. Please tighten the flange bolts diagonally with the same torque values, step by step up to the prescribed torque value.

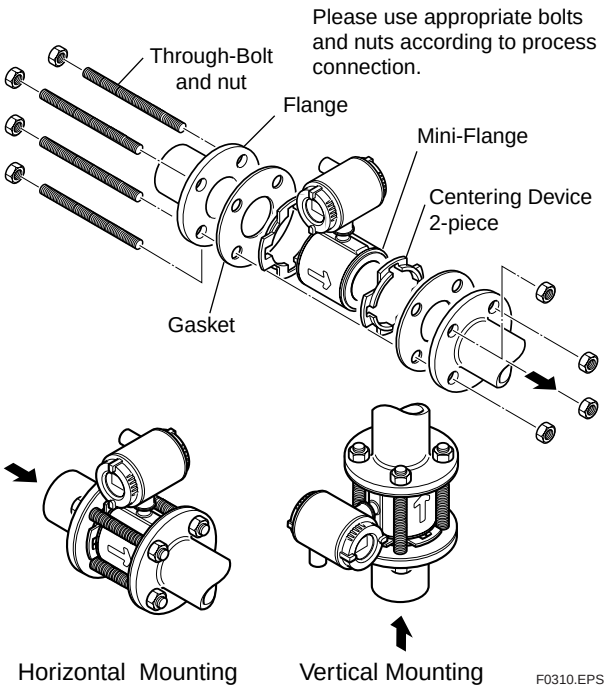

Figure 3.3.1 Mounting Procedure (Size: 15 mm(0.5in) to 40 mm(1.5in))

Table 3.3.1 Tightening Torque Values for Metal Piping in N-m{kgf-cm}[in-lbf]

Size mm(inch)	JIS 10K	JIS 20K	ANSI 150	ANSI 300	DIN PN40
15(0.5)	4.5 - 6.5 {46 - 66} [40 - 58]	4.5 - 6.5 {46 - 66} [40 - 58]	5.0 - 7.0 {51 - 71} [44 - 62]	5.0 - 7.0 {51 - 71} [44 - 62]	5.0 - 6.5 {51 - 66} [44 - 58]
25(1)	14.5 - 19.0 {148 - 194} [128 - 168]	14.5 - 19.0 {148 - 194} [128 - 168]	12.0 - 15.0 {122 - 153} [106 - 133]	14.5 - 19.0 {148 - 194} [128 - 168]	12.5 - 14.0 {128 - 143} [111 - 124]
40(1.5)	26.0 - 31.0 {265 - 316} [230 - 274]	26.0 - 31.0 {265 - 316} [230 - 274]	22.0 - 25.0 {224 - 255} [195 - 221]	30.0 - 37.0 {311 - 377} [270 - 327]	28.5 - 31.0 {291 - 316} [252 - 274]

*Please use compressed non-asbestos fiber gasket, PTFE gasket or the gasket which has equal elasticity. T0301.EPS

Table 3.3.2 Tightening Torque Values for PVC Piping in N-m{kgf-cm}[in-lbf]

Size mm(inch)	JIS 10K	JIS 20K	ANSI 150	ANSI 300	DIN PN40
15(0.5)	1.3 {13} [12]		1.3 {13} [12]		1.3 {13} [12]
25(1)	3.5 {36} [31]		2.8 {29} [25]		2.7 {28} [24]
40(1.5)	5.7 {58} [50]		4.6 {47} [41]		5.7 {58} [50]

*Please select optional code /FRG and use rubber gasket or others which has equal elasticity. T0302.EPS

3.3.2 Nominal Diameter 50 mm(2in) to 200 mm(8in) Wafer Type

IMPORTANT

Please use appropriate bolts and nuts according to process connection. In case stud type of through bolts are used, be sure outside diameter of a shank is smaller than a thread ridge's one. Please use compressed non-asbestos fiber gasket, PTFE gasket or the gasket which has equal elasticity. In case of optional code/FRG, please use rubber gasket or others which has equal elasticity. Be sure the inner diameter of the gasket does not protrude to inner piping. (Refer to Table 3.3.6)

(1) Mounting Direction

Please mount the Magnetic Flowmeter matching the flow direction of the fluid to be measured with the direction of the arrow mark on the flowmeter.

IMPORTANT

If it is impossible to match the direction, please never remodel to change direction of the terminal box. In case the measuring fluid flows against the arrow direction, please refer to the section 5.3.6 Reversing Flow Direction.

(2) Mounting Centering Devices

To keep concentricity between the Flow Tube and pipes, centering devices must be used. Pass two through-bolts through the four centering devices (two for each) and lower adjacent holes of both flanges. (Refer to Figure 3.3.2)

Please give attention to the nominal size and flange ratings of the centering devices. (Refer to Table 3.3.5)

(3) Positioning Flow Tube

Position the Flow Tube coming in contact four centering devices with Mini-Flanges. At this time, pay attention to avoid four centering devices come in contact with Housing. In case stud type of through-bolts are used, position them coming in contact four centering devices with thread of the bolts. (Refer to Figure 3.3.2) After positioning the Flow Tube, pass remaining through-bolts to remaining holes.

(4) Tightening Nuts

Please tighten the bolts according to Torque Values in Table 3.3.3. In case of PVC piping, please select optional code/FRG, use rubber gasket and tighten with the torque value in Table 3.3.4.

CAUTION

As the lining material is Fluorocarbon PFA, it is possible that nuts loose by its character as time passes. Please tighten the nuts regularly. Please be sure to tighten the bolts following prescribed torque values. Please tighten the flange bolts diagonally with the same torque values, step by step up to the prescribed torque value.

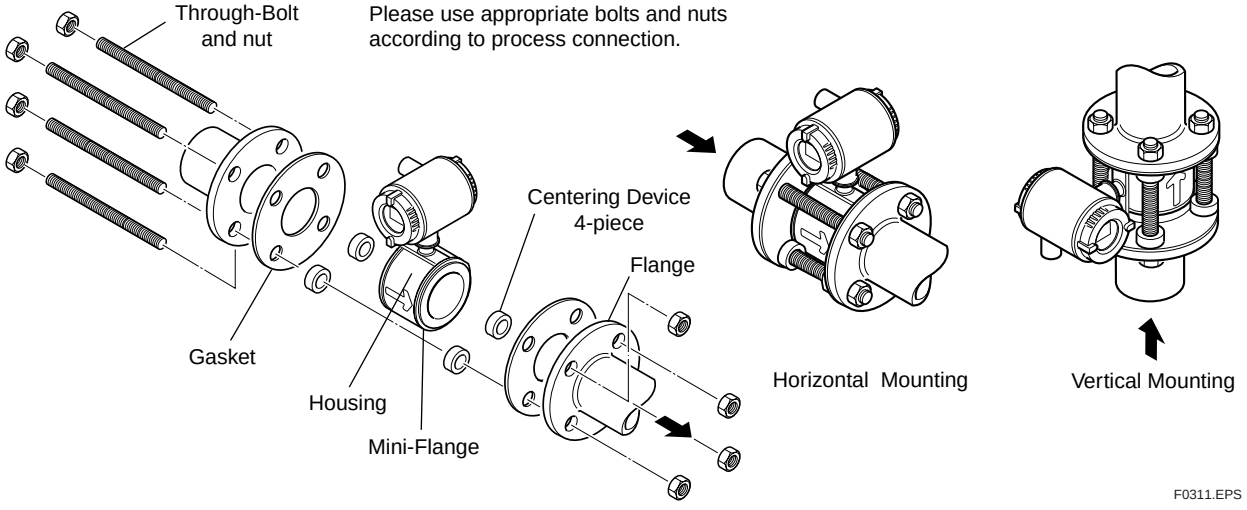

Figure 3.3.2 Mounting Procedure (Size: 50mm (2in) to 200mm (8in))

Table 3.3.3 Tightening Torque Values for Metal Piping in N-m{kgf-cm}[in-lbf]

Size mm(inch)	JIS 10K	JIS 20K	ANSI 150	ANSI 300	DIN PN10	DIN PN16	DIN PN40
50(2)	35.0 - 39.5 {357 - 403} [310 - 350]	16.5 - 19.5 {168 - 199} [146 - 173]	35.0 - 39.5 {357 - 403} [310 - 350]	16.5 - 19.5 {168 - 199} [146 - 173]			39.0 - 39.5 {398 - 403} [345 - 350]
80(3)	27.5 - 32.5 {281 - 332} [243 - 288]	33.0 - 41.0 {337 - 418} [292 - 363]	60.0 - 65.5 {612 - 668} [531 - 580]	32.0 - 39.0 {326 - 398} [283 - 345]		27.5 - 32.5 {281 - 332} [243 - 288]	
100(4)	40.0 - 42.5 {408 - 434} [354 - 376]	48.0 - 53.5 {490 - 546} [425 - 473]	40.5 - 42.5 {413 - 434} [358 - 376]	47.0 - 51.0 {479 - 520} [416 - 451]		40.0 - 42.5 {408 - 434} [354 - 376]	
150(6)	65.0 - 94.0 {663 - 959} [575 - 832]	43.0 - 68.0 {439 - 694} [381 - 602]	68.0 - 100.0 {694 - 1020} [602 - 885]	41.0 - 60.0 {418 - 612} [363 - 531]		65.0 - 94.0 {663 - 959} [575 - 832]	
200(8)	57.0 - 84.0 {581 - 857} [504 - 743]	61.0 - 92.0 {622 - 938} [540 - 814]	69.0 - 101.0 {704 - 1030} [611 - 894]	65.0 - 93.0 {663 - 949} [575 - 823]	94.0 - 125.0 {959 - 1275} [832 - 1106]	58.0 - 84.0 {592 - 857} [513 - 743]	

*Please use compressed non-asbestos fiber gasket, PTFE gasket or the gasket which has equal elasticity.

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Table 3.3.4 Tightening Torque Values for PVC Piping in N-m{kgf-cm}[in-lbf]

Size mm(inch)	JIS 10K	JIS 20K	ANSI 150	ANSI 300	DIN PN10	DIN PN16	DIN PN40	JIS G3451 F12(75M)
50(2)	8.2 {84} [73]		8.2 {84} [73]				8.2 {84} [73]	
80(3)	6.2 {63} [55]		12.4 {127} [110]			6.2 {63} [55]		12.3 {126} [109]
100(4)	8 {82} [71]		8.1 {83} [72]			8 {82} [71]		16.1 {164} [142]
150(6)	19.8 {202} [175]		18.9 {193} [167]			19.8 {202} [175]		21.6 {220} [191]
200(8)	17.5 {179} [155]		25.1 {256} [222]		26.2 {267} [232]	17.5 {179} [155]		28.7 {293} [254]

*Please select optional code /FRG and use rubber gasket or others which has equal elasticity.

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Table 3.3.5 Centering Device Identification

Size	JIS 10K	JIS 20K	ANSI 150	ANSI 300	DIN PN 10	DIN PN 16	DIN PN 40
50(2)	B	B	B	F	-	-	F
80(3)	B	F	F	C	-	G	-
100(4)	B	F	C	H	-	F	-
150(6)	K	L	K	M	-	K	-
200(8)	K	L	L	M	K	K	-

* Each Centering Device is engraved a character as identification.

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Table 3.3.6 Earth Ring Inside Diameter

Unit:mm(inch)

Size	Earth Ring inside diameter
15(0.5)	15(0.59)
25(1)	28(1.10)
40(1.5)	41(1.61)
50(2)	53(2.09)
80(3)	81(3.19)
100(4)	102(4.02)
150(6)	146.1(5.75)
200(8)	193.6(7.62)

* Please ensure that the I.D. of the gasket does not protrude into the I.D. of the Earth Ring. (This dimension is also applied when no earth ring is used.)

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3.3.3 Nominal Diameter 15 mm (0.5in) to 200 mm (8in) Flange Type

IMPORTANT

Please use appropriate bolts and nuts according to process connection. Please use compressed non-asbestos fiber gasket, PTFE gasket or the gasket which has equal elasticity. In case of optional code /FRG, please use rubber gasket or others which has equal elasticity. Be sure the inner diameter of the gasket does not protrude to inner piping. (Refer to Table 3.3.6)

(1) Mounting Direction

Please mount the Magnetic Flowmeter matching the flow direction of the fluid to be measured with the direction of the arrow mark on the flowmeter.

IMPORTANT

If it is impossible to match the direction, please never remodel to change direction of the terminal box. In case the measuring fluid flows against the arrow direction, please refer to the section 5.3.6 Reversing Flow Direction.

(2) Tightening Nuts

Please tighten the bolts according to Torque Values in Table 3.3.7. In case of PVC piping, please select optional code /FRG, use rubber gasket and tighten with the torque value in table 3.3.8.

CAUTION

As the lining material is Fluorocarbon PFA, it is possible that bolts loose by its character as time passes. Please tighten the nuts regularly. Please be sure to tighten the bolts following prescribed torque values. Please tighten the flange bolts diagonally with the same torque values, step by step up to the prescribed torque value.

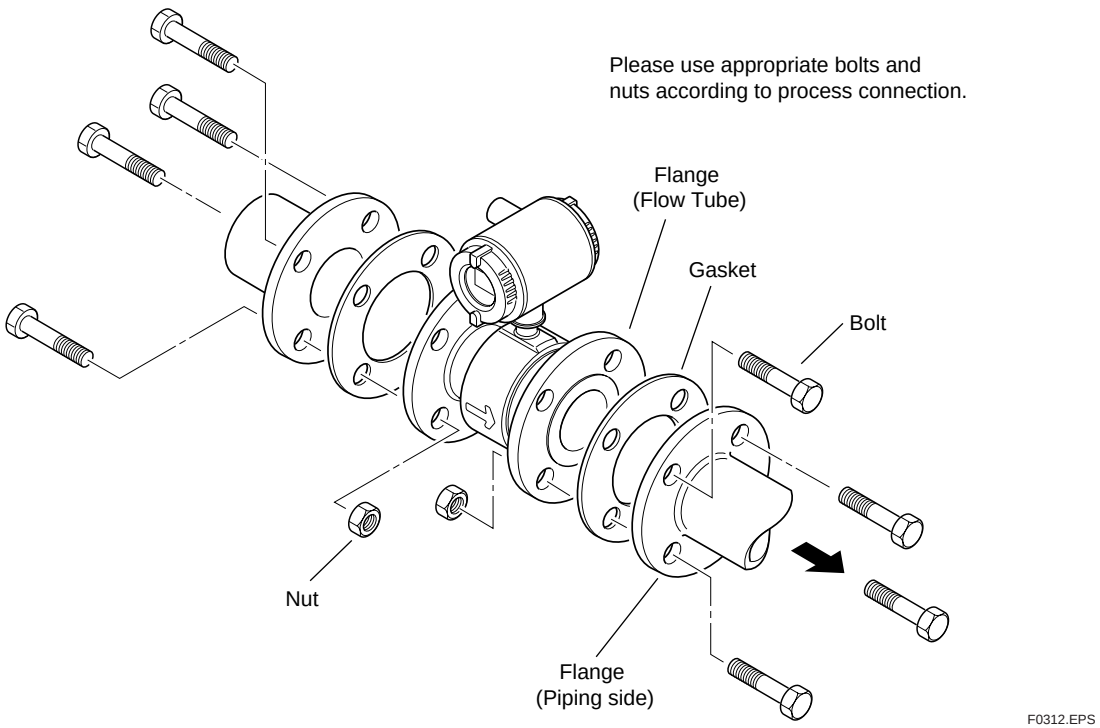

Figure 3.3.3 Mounting Procedure (Size: 15 mm (0.5in) to 200 mm (8in))

Table 3.3.7 Tightening Torque Values for Metal Piping in N-m{kgf-cm} [in-lbf]

Size mm (inch)	JIS 10K	JIS 20K	ANSI 150	ANSI 300	DIN PN10	DIN PN16	DIN PN40	JIS F12(75M)
15(0.5)	4.5 - 6.5 {46 - 66} [40 - 58]	4.5 - 6.5 {46 - 66} [40 - 58]	4.5 - 7.0 {46 - 71} [40 - 62]	4.5 - 7.0 {46 - 71} [40 - 62]			4.5 - 6.5 {46 - 66} [40 - 58]	
25(1)	13.5 - 19.0 {138 - 194} [119 - 168]	13.5 - 19.0 {138 - 194} [119 - 168]	11.5 - 15.0 {117 - 153} [102 - 133]	14.0 - 19.0 {143 - 194} [124 - 168]			11.5 - 14.0 {117 - 143} [102 - 124]	
40(1.5)	24.0 - 31.0 {245 - 316} [212 - 274]	24.0 - 31.0 {245 - 316} [212 - 274]	20.0 - 25.0 {204 - 255} [177 - 221]	28.0 - 37.0 {286 - 377} [248 - 327]			25.5 - 31.0 {260 - 316} [226 - 274]	
50(2)	31.0 - 39.5 {316 - 403} [274 - 350]	15.0 - 19.5 {153 - 199} [133 - 173]	32.0 - 39.5 {326 - 403} [283 - 350]	15.0 - 19.5 {153 - 199} [133 - 173]			34.5 - 39.5 {352 - 403} [305 - 350]	
80(3)	23.5 - 32.5 {240 - 332} [208 - 288]	28.5 - 41.0 {291 - 418} [252 - 363]	53.5 - 65.5 {546 - 668} [473 - 580]	28.5 - 39.0 {291 - 398} [252 - 345]		23.5 - 32.5 {240 - 332} [208 - 288]		51.0 - 65.5 {520 - 668} [451 - 580]
100(4)	32.5 - 42.5 {332 - 434} [288 - 376]	40.0 - 53.5 {408 - 546} [354 - 473]	34.5 - 42.5 {352 - 434} [305 - 376]	40.0 - 51.0 {408 - 520} [354 - 451]		33 - 42.5 {337 - 434} [292 - 376]		72.0 - 85.0 {734 - 867} [637 - 752]
150(6)	65.0 - 94.0 {663 - 959} [575 - 832]	43.0 - 68.0 {439 - 694} [381 - 602]	68.0 - 100.0 {694 - 1020} [602 - 885]	41.0 - 60.0 {418 - 612} [363 - 531]		65.0 - 94.0 {663 - 959} [575 - 832]		68.0 - 100.0 {694 - 1020} [602 - 885]
200(8)	57.0 - 84.0 {581 - 857} [504 - 743]	61.0 - 92.0 {622 - 938} [540 - 814]	69.0 - 101.0 {704 - 1030} [611 - 894]	65.0 - 93.0 {663 - 949} [575 - 1106]	94.0 - 125.0 {959 - 1275} [832 - 1106]	58.0 - 84.0 {592 - 857} [513 - 743]		69.0 - 101.0 {704 - 1030} [611 - 894]

* Please use compressed no-asbestos fiber gasket, PTFE gasket or the gasket which has equal elasticity.

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Table 3.3.8 Tightening Torque Values for PVC Piping in N-m{kgf-cm} [in-lbf]

Size mm (inch)	JIS 10K	JIS 20K	ANSI 150	ANSI 300	DIN PN10	DIN PN16	DIN PN40	JIS G3451 F12(75M)
15(0.5)	1.3 {13} [12]		1.3 {13} [12]				1.3 {13} [12]	
25(1)	3.5 {36} [31]		2.8 {29} [25]				2.7 {28} [24]	
40(1.5)	5.7 {58} [50]		4.6 {47} [41]				5.7 {58} [50]	
50(2)	8.2 {84} [73]		8.2 {84} [73]				8.2 {84} [73]	
80(3)	6.2 {63} [55]		12.4 {127} [110]			6.2 {63} [55]		12.3 {126} [109]
100(4)	8 {82} [71]		8.1 {83} [72]			8 {82} [71]		16.1 {164} [142]
150(6)	19.6 {200} [173]		18.8 {192} [166]			19.6 {200} [173]		21.5 {219} [190]
200(8)	17.5 {179} [155]		25.1 {256} [222]		26.2 {267} [232]	17.5 {179} [155]		28.7 {293} [254]

* Please select optional code /FRG and use rubber gasket or others which has equal elasticity.

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3.4 Wiring Precautions

CAUTION

Confirm that all connections are corrected before applying power to the instrument. Improper wiring may damage the flowmeter.

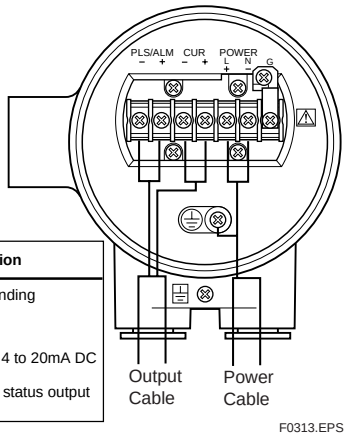
NOTE

The terminal box and display cover is locked by special screw. In case of opening the terminal box cover, please use the Hexagonal Wrench attached.

CAUTION

Be sure to lock the cover with the special screw using the Hexagonal Wrench attached after tightening the terminal box cover.

The external signal wirings are connected into the terminal inside the converter. Please connect to each terminal (Please refer to Figure 3.4.1) by taking off a cover backside the converter.



Terminal Symbols	Description
⏚	Protective grounding
POWER N– POWER L+	Power Supply
CUR+ CUR–	Current Output 4 to 20mA DC
PLS/ALM+ PLS/ALM–	Pulse, alarm or status output

Figure 3.4.1 WWiring

3.4.1 Protective Grounding

CAUTION

Please be sure to connect protective grounding of ADMAG SE with cable of 2mm^2 or larger cross section in order to avoid the electrical shock to the operators and maintenance engineers and prevent the influence of external noise. And further connect the grounding wire to the ⏚ mark (100Ω or less).

3.4.2 General Precautions

Please give attention to the followings in wiring.

CAUTION

- Please pay attention to avoid the cable is bended excessively.
- Please do not connect cables outdoors in case of rain to prevent damages from dew formation and to keep insulation inside the terminal box of the flowmeter.
- The all cable ends are to be provided with round crimp-on terminal.
- The power cables and output signal cables must be routed in separate steel conduit tubes or flexible tubes.(except 4-core 24VDC cable wiring.)
- When waterproof glands or union equipped waterproof glands are used, the glands must be properly tightened to keep the box watertight.
- Please install a external switch or circuit breaker as a means of power off (capacitance; 15A, conform to IEC947-1 and IEC947-3). The preferable location is either near the instrument or other places to easy operation. Furthermore, please indicate “power off equipment” on the those external switch or circuit breaker.
- Please be sure to fully tighten the terminal box cover before the power is turned on. After tightening the covers, please be sure to fix it withh the special screw using a hexagonal wrench attached.
- Please be sure to turn off the power before opening the covers.
- In case of DC power supply, a plug is attached. When 4-core cable is used, please put that plug into unused electrical connection port.

3.4.3 Power and Output Cables

Power Cable:

- Crimp-on Terminal
- Green/Yellow covered conductors shall be used only for connection to PROTECTIVE CONDUCTOR TERMINALS.
- Conform to IEC277, IEC245 or equivalent national authorization.

Output Cable:

- Please use Polyvinyl chloride insulated and sheathed control cables (JIS C3401) or Polyvinyl chloride insulated and sheathed portable power cables (JIS C3312) or equivalents.

Outer Diameter:

- 6.5 to 12mm in diameter (10.5 to 11.5mm for waterproof gland /ECG, /ECU)

Nominal Cross Section:

- Single wire; 0.5 to 2.5mm^2 , Stranded wire; 0.5 to 2.5mm^2

3.4.4 DC Connections

(1)Connecting Power Supply

IMPORTANT

In case of 24VDC power supply, AC power supplies or reversed polarities cannot be connected. It will cause the fuse to burn out.

IMPORTANT

In case of 24VDC power supply, the specification for the supply voltage is 24VDC (-15 to +20%), but the input voltage of the converter drops due to cable resistance so it should be used within the following range.

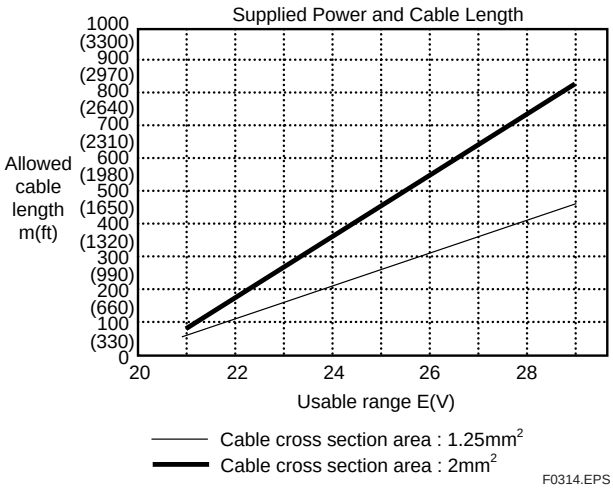


Figure 3.4.2 Supplied Power and Cable Length

(2)Setting Power Supply Frequency

IMPORTANT

In case of DC power supply, the frequency of the power supply has to be adjusted. Please adjust for the local power frequency. The power supply frequency is set in parameter B12 (or Power freq for HART). Refer to 5.2, 6.5.2, or 7.3.4 for data setting procedure.

3.4.5 Wiring Ports

Please select the most suitable standard of wiring procedure for the wiring ports by customer's own.

(1)Using the Waterproof Gland

IMPORTANT

To prevent water or condensate from entering the converter housing, waterproof glands are recommended. Do not over-tighten the glands or damage to the cables may result. Tightness of the gland can be checked by confirming that the cable is held firmly in place.

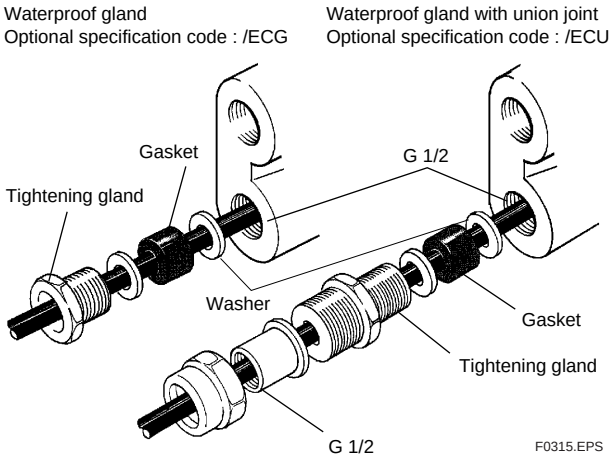


Figure 3.4.3 Waterproof Gland

(2)Conduit Wiring

In case of conduit wiring, please use the waterproof gland to prevent water flowing through the conduit pipe into the wiring connection.

Please slope the conduit pipe down, and install a drain valve at the low end of the vertical pipe.

Please open the drain valve regularly.

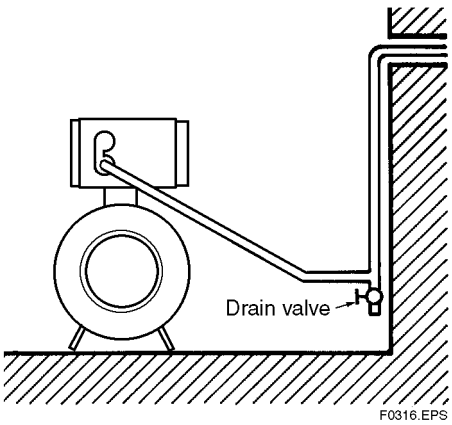


Figure 3.4.4 Conduit Wiring

3.4.6 Connecting to External Instruments

CAUTION

All the devices to be connected to current output and pulse output must be conformed to CSA1010, CSA950, or IEC950.

(1)Analog Signal Output(4 to 20mADC)

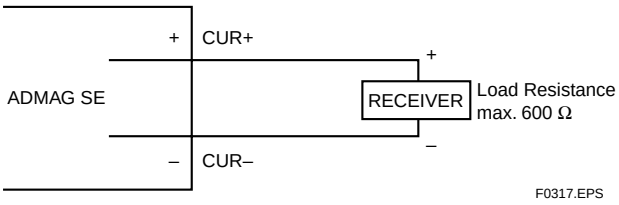


Figure 3.4.5 Connection for Analog Signal Output

(2)Pulse Output

IMPORTANT

Please give attention to voltage and polarity in wiring, because it is transister contact(insulation type.

- In case of the filtering constant of Electric Counter is more than the pulse width, it makes signal decreases and can not be calculated correctly.
- In case of input impedance of electric counter is large inductive noise from power supply bring bad influence to measurement. To calculate correctly, it is recommended to use shield cable or to make input impedance small enough within the limits of pulse output of flowmeter.

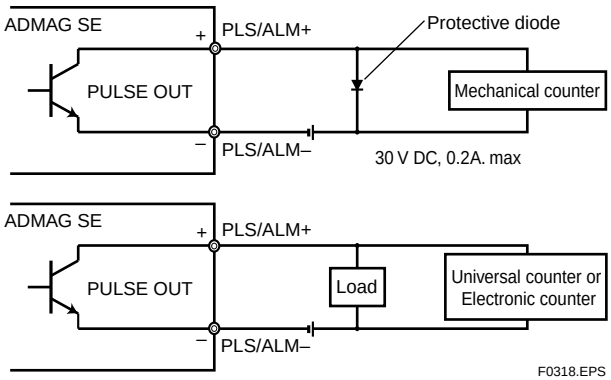


Figure 3.4.6 Pulse Output Connection

(3)Alarm or Status Output

IMPORTANT

This is a transistor contact(insulated type) so attention must be paid to volttage and polarity when making connections.
This output can not switch an AC load. To do this, another relay (see the figure below) is required.
* The alarm output works from “close”(Normal) to “open”(Alarm).

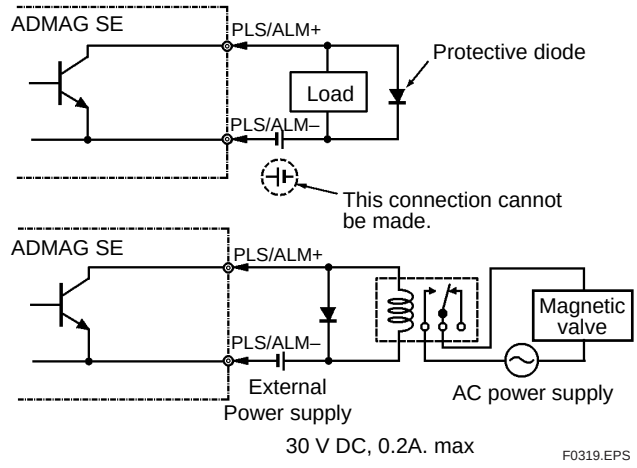


Figure 3.4.7 Contact Output Connection

4. BASIC OPERATING PROCEDURES

All data settings can be performed with the three keys on the front panel (SET,SHIFT, and INC), or using a handheld Brain Terminal (BT) or using a HART communicator. The following sections describe basic data components and how to use the three panel keys. (Please refer to Chapter 6 for the operation via Brain Terminal and Chapter 7 for the operation via HART communicator.)

4.1 Liquid Crystal Display (LCD)

ADMAG SE display panel (if equipped) shows the components as follows.

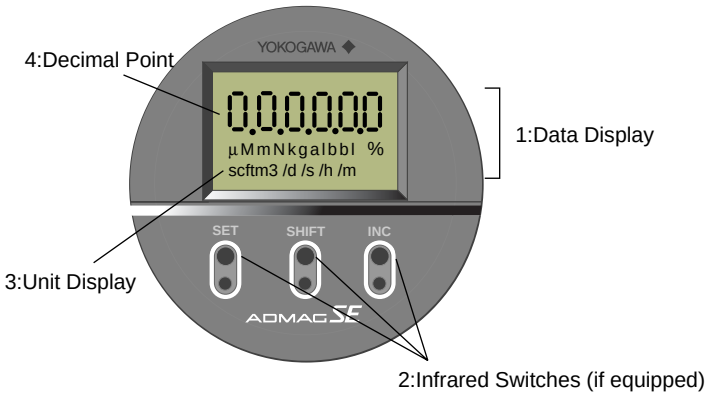
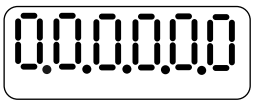


Fig.4 Components of Display

1: Data Display: Displays flow rate data, setting data and type of alarm generated.
2: Infrared Switches: These keys are used to change the display and type of setting data.
3: Unit Display: Displays flow rate units. In order to display other units, the required unit label should be selected from the provided data sheets.
4: Decimal Point: Displays decimal point.

• Structure of the Display



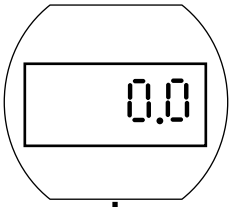
* The Display consists of six figure and five dots for the decimal point between them.
* Two types of data can be entered : direct entry of numerals and entry of desired data items using codes.
  Please refer to Chapter 11. Parameter List for information on how to change settings.

NOTE

The infrared switches operates as “ON” status by detecting the infrared ray reflection from a finger put over the switches through the glass plate of the cover. Switches are just below the printed letters SET, SHIFT, or INC on the faceplate and are circled with a white line.
When you “touch” the swiches, please note the follwing.
The switches may operate even when you don’t touch the glass plate if your finger comes near just above the glass plate. so please touch the switches sliding in your finger from the lower part of the glass plate. Also be sure not to touch more than one switch at one time by covering your other fingers over the faceplate.

4.2 Types of Display Data

The Display Data is divided into 5 types as follows.



Flow Rate Display Mode

Please refer to section 4.2.2

Pass-Word Input Mode

This mode indicates the instantaneous flow rate and totalization data. Display settings can be set in the Setting Mode and parameter No.“d01” (DISP SELECT) by using infrared switches, Brain Terminal, or HART communicator.

Setting Mode

Please refer to section 4.2.3

Number Changing Mode

Data Changing Mode

Data Confirmation Mode

This mode makes certain about contents of parameter and rewrite data.This mode is called up from Flow Rate Display Mode by touching the SET key for 3 sec. and inputting a password.

Alarm Display Mode

Please refer to section 4.2.4

When an alarm occurs in the Flow Rate Display Mode, this mode indicates the alarm code number and normal data alternately.

Auto Zero Mode

Please refer to section 4.2.5

This mode is indicated during automatic zero setting.

Indicator Error Mode

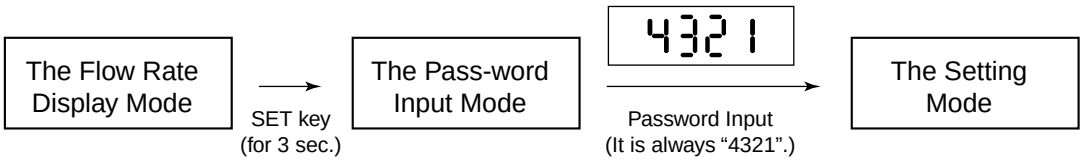
Please refer to section 4.2.6

This mode is shown in case the keys keep staying “ON” by stains or obstacles on front glass of the case.The error is canceled by cleaning them.

4.2.1 The Initial Procedure to Change the Display Mode

• The procedure of changing the display from the Flow Rate Display Mode into the Setting Mode by using infrared switches on the converter is described as follows.

(1) Procedure in General



(2) Procedure in Detail

Switch Operation	Display	Description
(After power on)	0.0 (example)	
SET SHIFT INC (for 3 sec.)	PASSno.	To go to the Setting Mode, it is needed to go to the Password Input Mode first. Please touch the **SET** key for 3 sec., and the display goes into the Password Input Mode.
SET SHIFT INC	0000	By touching the **SET** key again, the display goes into the Number Input Mode. Please input the Password as follows, by touching the **SHIFT** and **INC** keys.
SET SHIFT INC	4000	By touching the **INC** key for some moment, change "**0**" into "**4**".
SET SHIFT INC	4000	By touching the **SHIFT** key, the cursor moves to the next digit.
SET SHIFT INC	4300	By touching the **INC** key for some moment again, change "**0**" into "**3**".
	4321	By continuing this for the rest of two digits, please change the whole digits into "**4321**".
SET SHIFT INC	4321	By touching the **SET** key, whole Display is blinking.
SET SHIFT INC	4321 (Setting is now completed)	And by touching the **SET** key again, setting the password is completed.
SET SHIFT INC	b02	By touching the **SET** key again, the display goes to the number changing mode.

NOTE

In the Password Input Mode, if keys were not operated for more than 20 sec., or if correct password were not set, the display goes back into the Flow Rate Display Mode automatically.

• The procedure of returning from the Setting Mode to the Flow Rate Display Mode by using infrared switch on the converter is described as follows.

Switch Operation	Display	Description
SET SHIFT INC (**SHIFT** key first)	b02 0.0 (example)	The number changing mode of the Setting Mode. After all settings have been completed, touch the **SET** key simultaneously while touching the **SHIFT** key. Then the display goes back to the Flow Rate Display Mode.

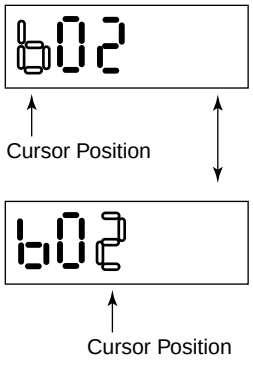
• Additional information on the functions of the keys is described here.

(1) Functions of SHIFT key

When the **SHIFT** key is touched in the Number Changing Mode, it shows as follows.

Number Changing Mode

SET SHIFT INC



<< The Cursor Position moves alternately by touching the **SHIFT** key.

(2) Functions of INC key

Number Changing Mode

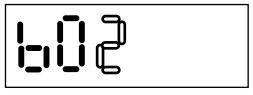
SET SHIFT INC

The **INC** key in the Number Changing Mode has each working at each cursor position.

a) In case the Cursor Position is at upper figure

The parameter number changes the followings by touching the **INC** key.

b) In case the Cursor Position is at lower figure



The parameter number changes from small number to big one by touching the **INC** key. For example; 02, 03, ···, 37, 02, 03, ··· (in case of parameters with “b”)

4.2.2 Flow Rate Display Mode

- Flow Rate Display Mode indicates flow rates and totalization data. ADMAG SE can indicate 12 types as follows.

DISPLAY ITEM	CONTENTS	INDICATOR		BT200 SETTING	HART Communicator
		Parameter No.	Code No.		
Flow Rate (%)	Instantaneous flow rate is displayed within a range of -8 (or –108%) to 108% for the span.	d01	00	D01: DISP SELECT RATE(%)	Disp Select PV % rnge
Flow Rate Actual Flow Rate	The actual meter rate of instataneous flow rate is displayed. (See NOTE) The decimal place is the same as for the span setting. However, since a decimal point set at the least significant bit cannot be displayed.	d01	01	D01: DISP SELECT RATE	Disp Select PV
Actual Flow Rate Totalization Values	Display actual flow rate totalization value	d01	02	D01: DISP SELECT FOR. TOTAL	Disp Select Totl
Reverse Flow Rate Totalization Values	Display reverse flow rate totalization value	d01	03	D01: DISP SELECT REV. TOTAL	Disp Select Rev. totl
Differential Between the Forward and Reverse Flow Totalization Values	Differential totalization between forward totalization and reverse totalization is displayed.	d01	04	D01: DISP SELECT DIF. TOTAL	Disp Select Diff. totl
Alternate Display of Flow Rate (%) and Forward Flow Rate Totalization Values	Display alternately between display of “RATE(%)” and “FOR. TTL” every 4 second interval.	d01	05	D01: DISP SELECT RATE %/FOR TTL	Disp Select PV % rnge/Totl
Alternate Display of Actual Flow Rate and Forward Flow Rate Totalization Values	Display alternately between display of “RATE” and “FOR. TTL”.	d01	06	D01: DISP SELECT RATE/FOR TTL	Disp Select PV/Totl
Alternate Display of Actual Flow Rate and Forward Flow Rate(%)	Display alternately between display of “RATE” and “RATE(%)” every 4 second interval.	d01	07	D01: DISP SELECT RATE/RATE %	Disp Select PV % rnge/PV
Alternate Display of Flow Rate (%) and Reverse Flow Totalization Values	Display alternately between display of “RATE(%)” and “REV. TTL” every 4 second interval.	d01	08	D01: DISP SELECT RATE %/REV. TTL	Disp Select PV % rnge/Rev. totl
Alternate Display of Forward Flow Rate and Reverse Flow Totalization Values	Display alternately between display of “RATE” and “REV. TTL” every 4 second interval.	d01	09	D01: DISP SELECT RATE/REV. TTL	Disp Select PV/Rev. totl
Alternate Display of Flow Rate (%) and Differential Flow Totalization Values	Actual flow rate (%) and differential between forward and reverse totalization values are indicated alternately every 4 sec.	d01	10	D01: DISP SELECT RATE %/DIF. TTL	Disp Select PV % rnge/Diff. totl
Alternate Display of Forward Flow Rate and Differential Flow Totalization Values	Actual flow rate and forward and reverse totalization values are indicated alternately every 4 sec.	d01	11	D01: DISP SELECT RATE/DIF. TTL	Disp Select PV/Diff. totl

NOTE

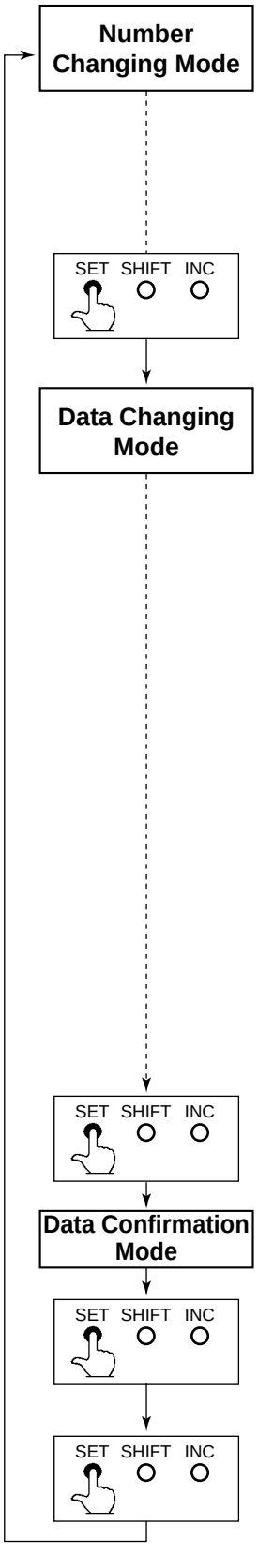
- The display can set the units by setting parameter No.“b04” and “b05”.
- When special display of flow rate is specified in parameter “d10 flow user unit”, this special display has higher priority in displaying than actual flow rate.

- Those 12 types function can be selected and set by changing into the Setting Mode. (Please refer to 4.2.3 Setting Mode.)
- Those 12 types function can be selected by using infrared switches, Brain Terminal, or HART communicator. (For using BT, please refer to Chapter 6. OPERATION VIA BRAIN TERMINAL(BT 200). For using HART communicator, Chapter 7. OPERATION VIA HART Communicator.)

4.2.3 Setting Mode

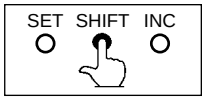
The Setting Mode confirms contents of parameter and rewrite data.

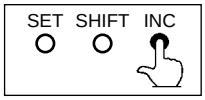
- Detailed procedures of data setting are explained in " Chapter 5. Function and Data Settings".
- Procedure of data setting



Cursor position is blinking.

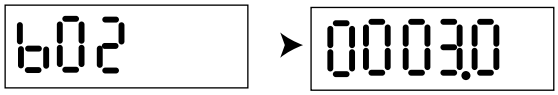
* When the display is in the Setting Mode just after power ON, it always starts from "b02".
* After that, it starts from the former selected number.



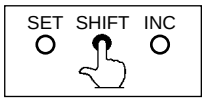


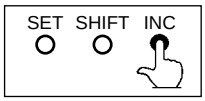
* Keys for number changing
SHIFT: for changing positions (to the right)
INC: for changing alphabets or numerals

* By touching the SET key the display goes to the Data Changing Mode.



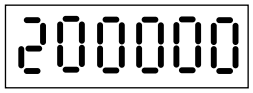
* Two types of data can be entered : direct entry of numerals and entry of desired data items using codes. Please refer to "Chapter 11. Parameter List" for information on how to change settings.



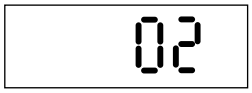


* Keys for data changing
SHIFT: for changing positions (to the right)
INC: for changing numerals or the position of decimal point

* Data types are as follows.



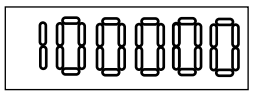
Direct entry of numerals



Entry of selected number

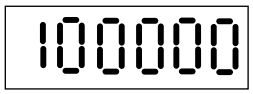
5-figure data = A decimal point is sure to show somewhere, The last figure (6th figure) is always SPACE.
6-figure data(totalized value) = A decimal point doesn't show anywhere and no SPACE.
Selection type data = It is always 2-figure(other figures are always SPACE).

The marks are always shown at the highest figure.
It changes: "+" and "–" ("+" is shown as " ⊢".)



Whole display is blingking.

* When it is the Data Changing Mode and touch **SET** key, it changes into the Data Confirmation Mode, whole of the display begins to blink.
* During the display is blinking, touch the **SET** key, then the data is completed.
* Then touch the **SET** key again and the display goes back to the Number Changing Mode.
* During the display is blinking and touch other keys except the **SET** key, the data setting is canceled and the display goes back to the Number Changing Mode.



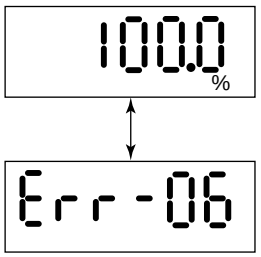
Data is completed.

4.2.4 Alarm Display Mode

• When an alarm occurs, a content of the alarm is shown as an alarm code number. However, this mode is available during the Flow Rate Display Mode. In this mode, alarm number and flow rate are shown alternately.

For example;

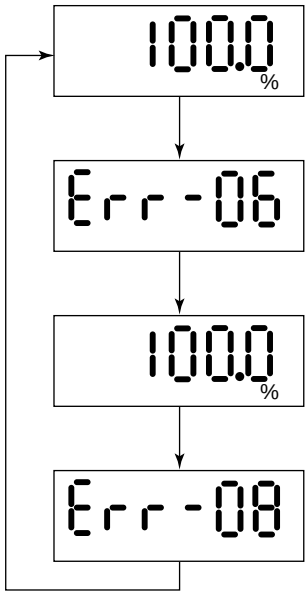
• When alarm No. 6 is raised.



<< Flow Rate is indicated for 4 sec.

<< Alarm No. is indicated for 2 sec.

• When alarm No.6 and No.8 are raised at the same time.



<< Flow Rate is indicated for 4 sec.

<< Alarm No.6 is indicated for 2 sec.

<< Flow Rate is indicated for 4 sec.

<< Alarm No.8 is indicated for 2 sec.

NOTE

For further description of the alarm functions, please refer to “Chapter 8.2 Self-diagnostics Functions”.

4.2.5 Auto Zero Mode

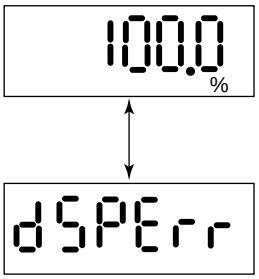
- Three ways of the auto zero adjustment can be done by using the infrared switches on the converter, BT Terminal, or HART communicator.
  Please refer to “8.1 Pre-Operation Zero Adjustment” in detail.
- The display can be changed into the Auto Zero Mode from any mode.
- The Auto Zero Mode is shown as follows (for 20sec.).

- When the Auto Zero Mode is finished, the display goes back into the Flow Rate Display Mode automatically.

4.2.6 Indicator Error Mode

In the event the glass is stained or objects are placed near or on the glass, the switches can be activated due to the infrared deflection. This will cause the "Password Input Mode" to be displayed frequently and make the normal display mode unavailable. The following comments relate to this possible occurrence.

* When the front glass of case is stained, please wipe out the glass by soft and dry cloth.
* In case that each key keeps touching for more 120 sec. and it is continued, the Password Input Mode is not available to enter.
* In case all keys are “OFF” for more 3 sec. , this mode is cancelled.
* This condition (the above-mentioned) is not an alarm, but the followings are shown on LCD to indicate this condition.
  (4 to 20 mA Output , Status Output , Flow Rate Indication Value and Self-check Function work normally.)
* When these errors are raised, the display indicates alternately as follows.



<< Flow Rate is indicated for 4 sec.

<< Warning is indicated for 2 sec.

IMPORTANT In case of the front cover is loosened, "dSPErr" may occur, so please make sure the cover is always fastened tightly.

5. FUNCTION AND DATA SETTINGS

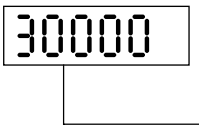
A Magnetic flowmeter calculates volume flow rate from a minute voltage that corresponds to the flow velocity of a fluid an outputs as a 4 to 20mA signal.

NOTE

The three parameters must be set to obtain a correct signal.
Nominal size, flow span and meter factor must be set.
In these three factors, Nominal size (unit:mm) and meter factor are set before shipment.

This chapter explaines how to set flow span, other functions and data settings.
Please set data correctly.

NOTE



- you cannot set the leftmost digit of display to numeric value greater than "4". If the leftmost digit of the span must be "4| or more, set the numeric value beginning from the digit second from the left on the display (the fourth digit).
- If the leftmost digit of the display is set to "3", the digits to its right can be set to "0" only, regardless of the decimal point position

Basic Key Operations

Item	Key Operation
How to change the display into the setting mode?	SET
How to move the cursor on the display during parameter setting?	SHIFT
How to change the display into the data changing mode?	SET
How to move the cursor in the data changing mode?	SHIFT
How to change the data?	INC
Finally, How to input the set data?	SET (Twice)

5.1 Setting Flow Span

(1) Determing the Flow Span

The flow rate span is the instantaneous flow rate value at which the output current is to be 20mA.
Please determine the span under considering the followings.

- Please set the maximum flow rate at the most variable flow rate line.
  If the flow rate of the fluid exceeds the flow rate span value, the flow rate that exceeds this value (20mA or more) is not output and the flowmeter will not display the correct flow rate. (108% or more can't be output)
- In a line where the flow rate is comparatively stable, set a value that is 1.5 to 2.0 times larger than the normal flow rate.
- Please set a value that will correspond to a flow velocity of 0.3 to 10m/s.
  Please comfirm the flow velocity by sizing data or parameter No. "**b13**".
  (Parameter No. "**b13**" indicates corresponding flow velocity to set span)
- The basic input value for display is flow span value. It is recommended that the accuracy of the first digit is in a 0.05 to 0.1% in case inputting the flow rate span value.
  For example, 30m^3/h should be set as 30.00m^3/h.
- In a span setting, the maximum value that can set is "30000" except any relation with decimal position.

(2) Span Settings by Infrared Switches on the Converter (Example: Flow Span 30.00m³/h)

● Span Value Setting

Switch Operation	Display	Description
	PASSno. (See 4.2.1 The initial procedure to change the display)	Change into the password input mode through the setting mode. (Please refer to Chapter 4 "BASIC OPERATION PROCEDURES.")
SET SHIFT INC	b02	
SET SHIFT INC	b02	By touching the **SHIFT** and **INC** key, set the parameter No. "**b03**".
SET SHIFT INC	b03	
	Defalt is set as 1.0000. Please change this into 0030.0.	
SET SHIFT INC	b03 ⇨ 1.0000	By touching the **SHIFT** key, change into the data changing mode.
SET SHIFT INC	0.0000	By touching the **INC** key, change into "**0**".
SET SHIFT INC	0.0000	By touching **SHIFT** key, the cursor moves to the decimal point. The decimal point on the cursor can be moved by touching the **INC** key.
SET SHIFT INC	000.00	
SET SHIFT INC	000.00	And by touching **SHIFT** key, blinking part moves to the right.
SET SHIFT INC	030.00	By touching **INC** key, change into "**3**".
SET SHIFT INC	030.00	By touching **SET** key, whole Display is blinking. And by touching the **SET** key again, the data is completed.
SET SHIFT INC	030.00 (Setting is now completed)	
SET SHIFT INC	b03	

● Setting Volume Measurement (m^3) and Time Unit (/h)

Switch Operation	Display	Description
(Select m^3)		Change into the number changing mode through the setting mode.
SET SHIFT INC	b03	By touching the **SHIFT** and **INC** key, please set the parameter No.“**b04**”.
SET SHIFT INC	b04	
SET SHIFT INC	12 (Defalt : 12)	And by touching the **SET** key, change into the data changing mode.
SET SHIFT INC	01	By touching the **INC** key, set the “**01**” (equivalent as m^3)
SET SHIFT INC	01	By touching the **SET** key, whole display is blinking. And touching the SET key again, the data is completed.
SET SHIFT INC	01	
SET SHIFT INC	b04	And by touching the **SET** key, the data is completed and back into the number changing mode.
(Select /h)		
SET SHIFT INC	b04	By touching the **SHIFT** and **INC** key, set the parameter No. “**b05**”.
SET SHIFT INC	b05	
SET SHIFT INC	03 (Defalt : 03)	By touching the **SET** key, change into the data changing mode.
SET SHIFT INC	01	By touching the **INC** key, set the “**01**” (equivalent as /h)
SET SHIFT INC	01	By touching the **SET** key, whole display is blinking. And touoching the **SET** key again, the data is completed.
SET SHIFT INC	01 (Setting is now completed)	* If keys that except **SET** key are touched during display is blinking, input data is not completed and back to former data.
SET SHIFT INC	b05	

Code	Volume Unit
00	$km^3(10^3 \times m^3)$
01	m^3
02	L(liter)
03	$cm^3(10^{-2} \times m)^3$
04	M gal
05	k gal
06	gal
07	m gal
08	k bbl
09	bbl
10	m bbl
11	u bbl
12	m
13	ft.

Code	Time Unit
00	/d
01	/h
02	/m
03	/s

5.2 Power Frequency (For DC Power Supply Version only)

IMPORTANT In case of DC power supply version, setting power frequency is required.

Display	Description
b12 ⇨ 50.00 Default: 50.00Hz	Set the value in areas where the frequency differs in "**b12**".

5.3 Other Functions and Settings

5.3.1 Pulse Output

NOTE PLS/ALM+, PLS/ALM– terminals are for common use with pulse, alarm and other status output functions. Therefore, in case this function is used, other functions are not available to use.

(1) Pluse Output Overview

- By setting a pulse weight, a scaled pulse is transmitted to external counters or measuring instruments.

Pulse Output Overview

Item	Content
Output Specifications	Transistor contact output (contact capacity is 30V DC, 200mA)
Connecting Terminals	PLS/ALM+, PLS/ALM– When using these for pulse output, alarm output or status output are not available as the terminals are used commonly.
Pulse Width	Selection: DUTY50%, 0.5, 1, 20, 33, 50, 100ms
Output Rate	Min. 0.0001p/s, Max. 1000p/s

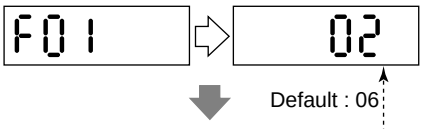
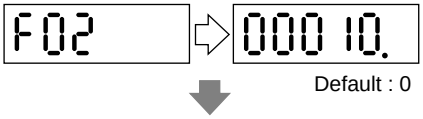
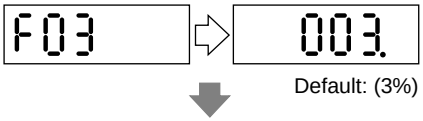
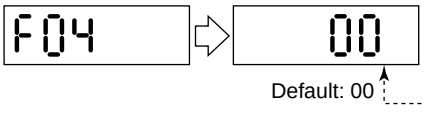
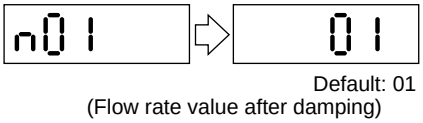
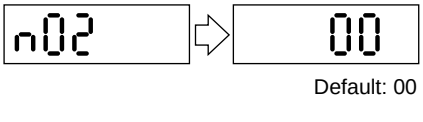
* Please refer to "3.4.5 Output Connection to External Instruments" for information how to connect external instruments.

(2) Procedures for Setting Pulse Output

Example setting: 10L output per pulse in a flow rate span of □□□ m^3/h

Display	Description
b10 ⇨ 00 Default: 00	Pulse output can be set in parameter No. "b**10**" and selected "**00**" (Pulse output).

Code	Content
00	Pulse output
01	Alarm output
02	Forward / reverse flow measurement
03	Automatic two range switching
04	Alarm output at low flow limit
05	Totalization switch

Display	Description
	After setting the number changing mode, the unit of pulse weight is set in parameter No. "**F01**". **Code** / **Volume Unit** 00 Volume unit in that for the flow rate span × 10^{-9} 01 Volume unit in that for the flow rate span × 10^{-6} 02 Volume unit in that for the flow rate span × 10^{-3} 03 Volume unit in that for the flow rate span × 1 04 Volume unit in that for the flow rate span × 10^{3} 05 Volume unit in that for the flow rate span × 10^{6} 06 Number of pulses output per second at 100% output When Pulses are to be output per same liter with the flow rate span of □□m^3/h, select "**02**" since L = 10^{-3} × m^3
	Set the pulse weight "**10**" in parameter No. "**F02**".
	Set the low cut range nearby 0% in parameter No. "**F03**". Setting Range: 0 to 100% (of span)
	The pulse width can be set in parameter No. "**F04**". **Code** / **Pulse Width** 00 50%DUTY (Max. 1000p/s Min. 0.0001p/s) 01 0.5ms (Max. 1000p/s Min. 0.0001p/s) 02 1ms (Max. 500p/s Min. 0.0001p/s) 03 20ms (Max. 25p/s Min. 0.0001p/s) 04 33ms (Max. 15p/s Min. 0.0001p/s) 05 50ms (Max. 10p/s Min. 0.0001p/s) 06 100ms (Max. 5p/s Min. 0.0001p/s)
Normally, these are all required settings. The following settings are made depending on the applications that are used.	
	The pulse output calculation can be set in parameter No. "**n01**" by selecting flow rate or flow rate value after damping.
	In case the pulse output transistor should be OFF ACTIVE, please change the parameter No. in "**n02**" to "**01**".

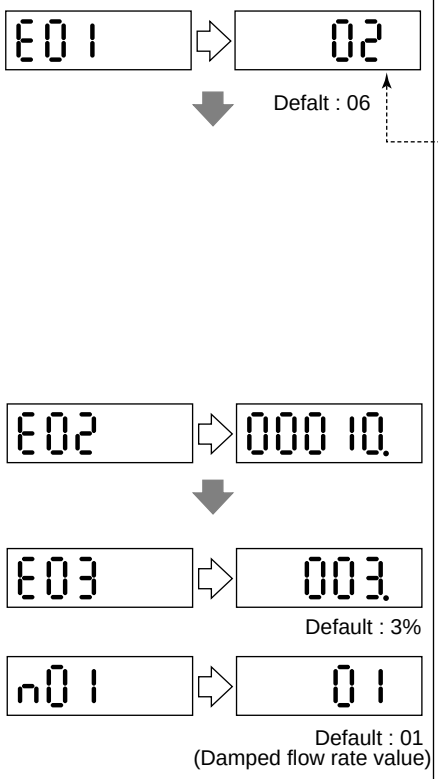
5.3.2 Display of Internal Totalization Values

- By setting a weight per a pulse, flow rate totalized value is shown on the display of the converter.

(1) Setting Totalization Pulse Weight

Example: To output 10 L per pulse in flow rate span of □□□ m^3/h.

Display



Description

Set the pulse weight unit in parameter No. "**E01**".

Code	Volume Unit
00	Volume unit in that for the flow rate span × 10^{-9}
01	Volume unit in that for the flow rate span × 10^{-6}
02	Volume unit in that for the flow rate span × 10^{-3}
03	Volume unit in that for the flow rate span × 1
04	Volume unit in that for the flow rate span × 10^{3}
05	Volume unit in that for the flow rate span × 10^{6}
06	Number of pulses output per second at 100% output

When Pulses are to be output per same liter with the flow rate span of □□ m^3/h, select "**02**" since L = $10^{-3} \times m^3$

Set the pulse weight "10(l)" in parameter No. "**E02**".

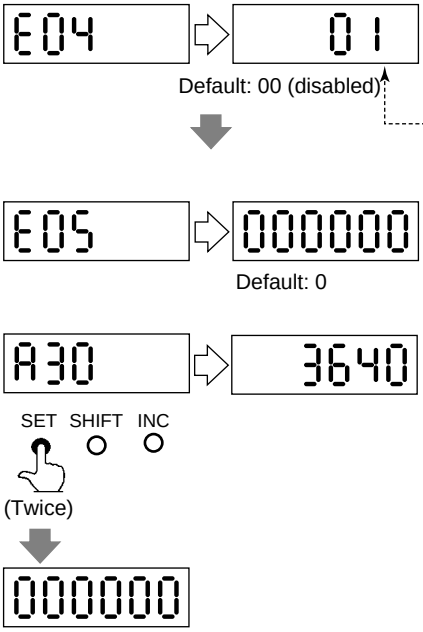
Set the low cut range nearby 0% in parameter No. "**E03**".
Setting Range: 0 to 100% (of span)

The flow rate totalized value calculation can be set in parameter No. "**n01**" by selecting "**NO DAMPING**" or "**DAMPING**".

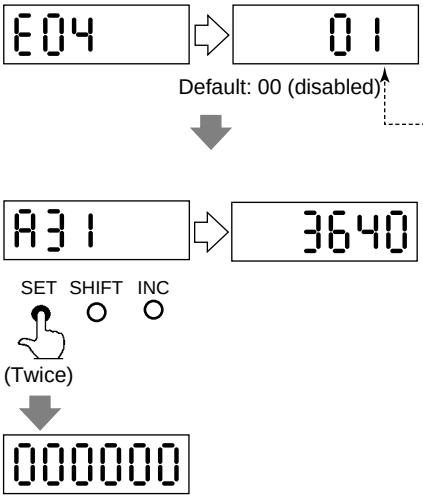
5.3.3 Resetting for Totalization Display

(1) Presetting for Forward Totalization Display

• E04, E05 are used for reset or preset the totalization values of the display.

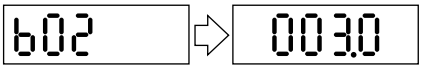
Display	Description
	The totalization value presetting enable can be selected at parameter No. "**E04**". **Code** / **Content** 00 Totalization preset inhibit 01 Totalization preset enable The totalization value presetting enable is selected at parameter number "**E05**". The initial value is "**0**", if it is no setting, the function is zero setting. During the A30 :TOTAL (totalization value of flow rate) is shown, the totalization value display is becoming the value that is set at parameter number "**E05**", by touching **SET** key twice.

(2) Zero-resetting for Reverse Toralization Display

Display	Description
	The totalization value presetting enable can be selected at parameter No. "**E04**". **Code** / **Content** 00 Totalization preset inhibit 01 Totalization preset enable During the A31 :REV.TOTAL (totalization value of reverse flow rate) is shown, the totalization value display is becoming zero, by touching **SET** key twice.

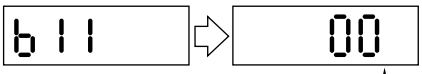
5.3.4 Damping Time Constant

- The time constant can be changed by setting the parameter No. "**b02**" to suppress a fluctuation or change a response time.
- The time constant influences to flow rate, pulse output and internal totalization. However, in case "**00**" is selected in parameter No. "**n01**", the pulse output and internal totalization are not influenced by it.

Display	Description
 Default: 3(sec).	The time constant can be set in parameter No. "**02**". Setting Range: 0.5 to 200.0 sec.

5.3.5 Current Output during Alarm Occurrence

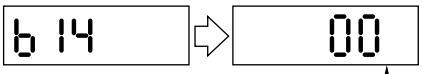
- The current output and display values during alarming can be selected in advance.

Display	Description
 Default: 03	The current output value during alarming can be set in parameter No. "**b11**".

Code	Content
00	2.4mA or less
01	4.0mA
02	HOLD
03	21.6mA or more

5.3.6 Reversing Flow Direction

- The flow direction is set to "**FORWARD**" at the factory. This function enables to set flow direction from "**FORWARD**" to "**REVERSE**".

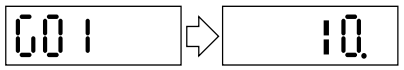
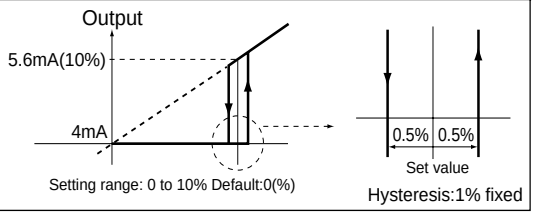
Display	Description
 Default: 00	The flow derection can be set in parameter No. "**b14**".

Code	Content
00	Forward direction
01	Reverse direction to flow arrow

5.3.7 Limiting Current Output

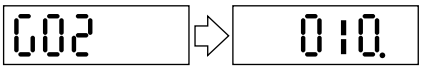
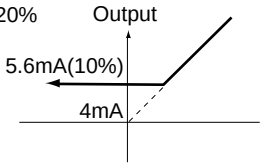
(1) 4 to 20mA Low Cut Output (Current output nearby 0% range)

- This function makes it possible to reduce fluctuations in the 0% region to reduce it to 0%.

Display	Description
 Default : 00	

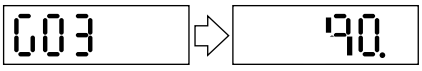
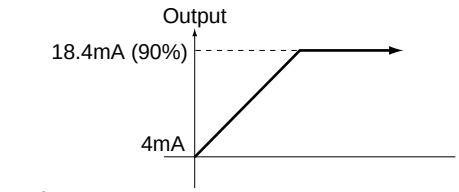
(2) 4 to 20mA Low Limit

- This function limits the low end of the analog output.
- The default value is set at –20%, and –10% as reverse flow limit. Please set in case other setting is required.
- 2.4mA or less output in alarming is also limited.

Display	Description
 Default : -20(%)	Setting Range: –20 to 100% Default: –20% 

(3) 4 to 20mA High Limit

- This function limits the high end of the analog output.
- The default value is set at 120%, and please set in case other setting is required.
- 21.6mA or more output in alarming is also limited.

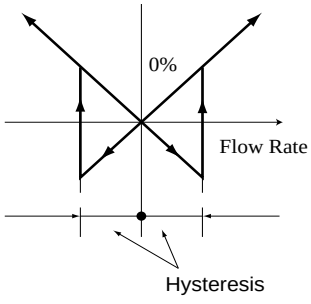
Display	Description
 Default : 120(%)	

5.3.8 Forward and Reverse Flow Measurement

- This function enables to measure forward and reverse flow rate without change the detector direction.
- By setting reverse range, in case fluids flow to reverse direction the flowmeter measures it as reverse direction range automatically. In this time, a status signal that shows changing into the reverse direction is output.
- To set the internal totalizing function for forward direction can also show it for reverse direction by parameter settings.
- PLS/ALM+, PLS/ALM– terminals are used for output connection.

NOTE

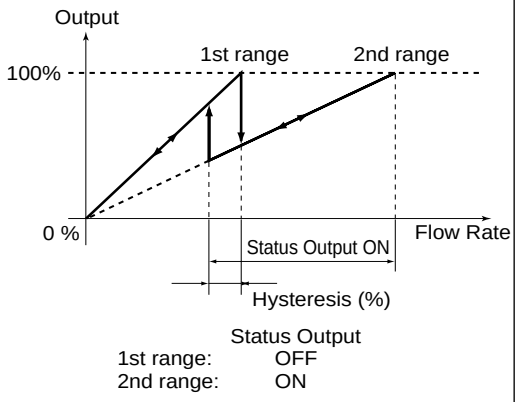
PLS/ALM+, PLS/ALM– terminals are for common use with pulse, alarm and other status output functions. Therefore, in case this function is used, other functions are not available to use.

Display	Description
b10 ⇨ 02 Default: 00	F and R flow rate measurement can be selected as "**02**" in parameter No. "**b10**". **Code** / **Content** 00 Pulse output 01 Alarm output 02 Forward / reverse flow measurement 03 Automatic two range switching 04 Alarm output at low flow limit 05 Totalization switch
b30 ⇨ 1.0000	Reverse direction span can be set in parameter No. "**b30**". Flow rate unit is the same as forward direction span. Futher reverse range span should be set in the same number of places of decimals as forward range span. Example: forward flow rate : 1.000 then revers flow rate should be 4.000.
b31 ⇨ 02. Default: 2%	Hysteresis width at switching direction can be set in parameter No. "**b31**". It is the rate (%) of the smaller span, either forward or reverse span.  Status output Forward flow measurement: OFF Reverse flow measurement: ON When using reversed status (ON/OFF) is required, it can be set in "N02 Output Mode".

5.3.9 Automatic Two Range Switching

- When an input exceeds 100% of the first range, the range is automatically transferred to the second range and the status output changes state.
- PLS/ALM+, PLS/ALM– terminals are used for output connection.

> **NOTE**
>
> PLS/ALM+, PLS/ALM– terminals are for common use with pulse, alarm and other status output functions. Therefore, in case this function is used, other functions are not available to use.

Display	Description
b10 ⇨ 03 Default : 00	Automotic two range transfer can be selected "**03**" in parameter No. "**b10**". **Code** / **Content** 00 Pulse output 01 Alarm output 02 Forward / reverse flow measurement 03 Automatic two range switching 04 Alarm output at low flow limit 05 Totalization switch
b33 ⇨ 1.0000 Default : 1.0000	Forward second range can be set by calling up parameter No. "**b33**". Setting restrictions: First range ≤ 2nd range. Further second range span should be set in the same number of places of decimals as first range span in parameter No. "**b03**". Example: First range : 1.000 then second range should be 4.000
b34 ⇨ 10. Default: 10%	Hysteresis width at switching range can be set in parameter No. "**b34**". It is the rate (%) of first range span.  Status Output 1st range: OFF 2nd range: ON When using reversed status (ON/OFF) is required, it can be set in "N02 Output Mode".

5.3.10 Alarm Output at Low Flow Limit (Flow Switch)

- In case flow rate decrease under set level, an status signal is output.

> **NOTE** PLS/ALM+, PLS/ALM– terminals are for common use with pulse, alarm and other status output functions. Therefore, in case this function is used, other functions are not available to use.

Display

b10 ⇨ 04

Defalt : 00

b36 ⇨ -010.

Defalt : -10(%)

b37 ⇨ 05.

Default : 5(%)

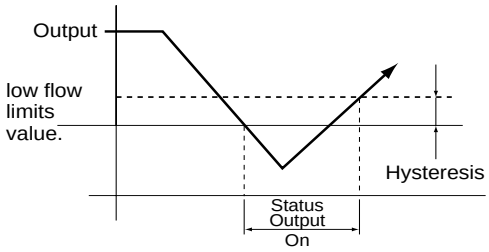
Description

Alarm output at low flow limits can be selected "**04**" in parameter No. "**b10**".

Code	Content
00	Pulse output
01	Alarm output
02	Forward / reverse flow measurement
03	Automatic two range switching
04	Alarm output at low flow limit
05	Totalozation switch

The Low Limit value can be set in parameter No. "**b36**" as parcentage for 4 to 20 mA.

Hysteresis width is set in parameter No. "**b37**".

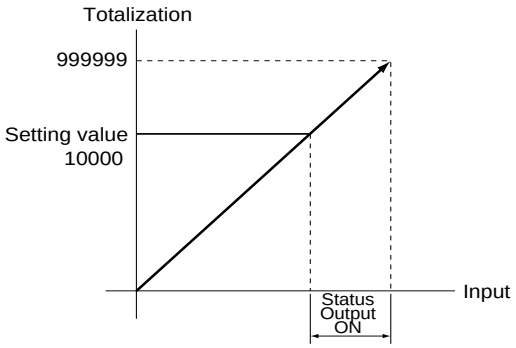


When using reversed status (ON/OFF) is required, it can be set in "N02 Output Mode".

5.3.11 Totalization Switch Output

- In case the Internal Totalization Value increase over set level, an alarm signal is output.

> **NOTE** PLS/ALM+, PLS/ALM– terminals are for common use with pulse, alarm and other status output functions. Therefore, in case this function is used, other functions are not available to use.

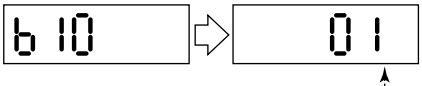
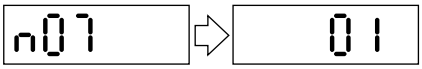
Display	Description
b10 ⇨ 05 Default : 00	Totalization switch can be selected as "**05**" in parameter No. "**b10**". **Code** / **Content** 00 Pulse output 01 Alarm output 02 Forward / reverse flow measurement 03 Automatic two range switching 04 Alarm output at low flow limit 05 Totalization switch
E06 ⇨ 0 10000 Default : 0	Switch level can be selected by calling up parameter No. "**E06**".  When using reversed status (ON/OFF) is required, it can be set in "N02 Output Mode".

5.3.12 Alarm Output

- This function is for status output from PLS/ALM+, PLS/ALM– terminals, when an alarm occurs.

> **NOTE**
> PLS/ALM+, PLS/ALM– terminals are for common use with pulse, alarm and other status output functions.
> Therefore, in case this function is used, other functions are not available to use.

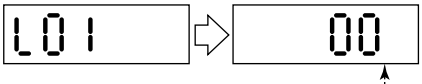
- All of the alarms are able to output except empty pipe detection function that can be selected in parameter No. "**n07**" as out of selection.
- The status goes from close to open (OFF) during alarming.

Display	Description
 Default: 00	The alarm output can be selected "**01**" in parameter No. "**b10**" and P+, P– terminals are only for alarm output. **Code** / **Content**: 00 Pulse output; 01 Alarm output; 02 Forward / reverse flow measurement; 03 Automatic two range switching; 04 Alarm output at low flow limit; 05 Totalization switch
 Default: 01	The empty pipe output selection can be set in parameter No. "**n07**". **Code** / **Content**: 00 ALARM; 01 NO ALARM

* Item "**n**" can be called up in setting "**55**" in parameter No. "**L02**".

5.3.13 Data Settings Enable / Inhibit

- This function can inhibit to change all data except parameter No. " **L01**".
  However, auto zero adjustment function can work, if it has been set in parameter No. "**C01**".
  And the preset totalization value function also can work, if it has been set in parameter No. "**E04**".

Displayed	Description
 Default: 01	The data settings inhibit item can be set "**00**" in parameter No. "**L01**". **Code** / **Content**: 00 INHIBIT; 01 ENABLE

5.3.14 Procedure of Selecting Special Application Items

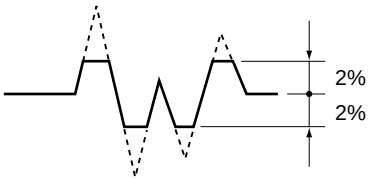
- Only the special apprication ("**n**" items) shipped being unpublished.
  In case the "**n**" items should be used, it can be set "**55**" in parameter No. "**L02**".

Displayed	Description
L02 ⇨ 55. Default: 00	The "**n**" items can be set "**55**" in parameter No. "**L02**". **Code** / **Content** 00 — Accessible up to L parameters. 55 — Accessible up to n parameters.

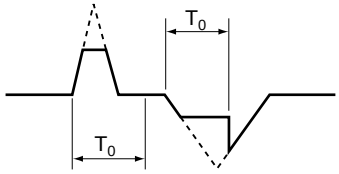
5.3.15 Rate Limit

- This function is used to remove noise that cannot be removed by increasing the damping time constant.
- In case unexpected noise from step signal or slurry is entered, a basis is set to recognize that signal is flow rate or noise.
  The recoginition depends on rate limit value (upper and lower limit) and dead time (sampling time).
- Determination of rate limit value and dead time.

Rate limit value:
Determine the level to reduce output fluctuation.
For example, reducing 2% or more fluctuation by setting as 2% to reduce.

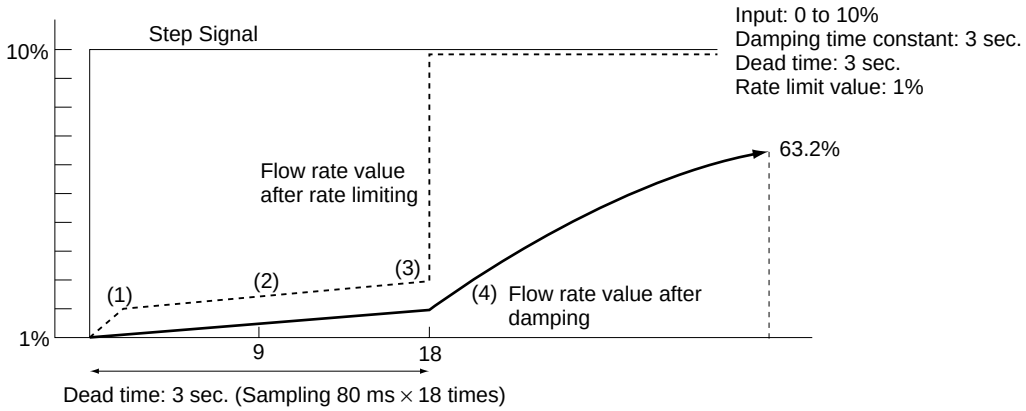


Dead time T_0:
Please determine the dead time depending on ouput fluctuation width.
In case of noise of which is longer than the dead time, please set the dead time longer.



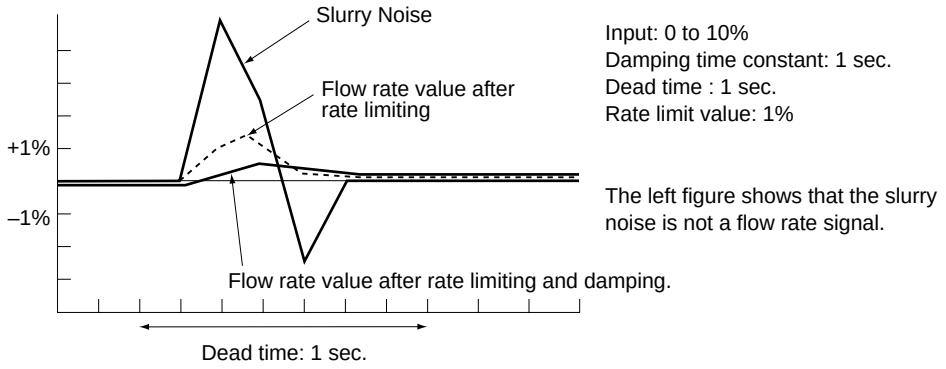
- **Signal processing procedures:**
  The function sets a certain upper and lower limit (rate limit value) for first order delay response values of flow rate data obtained in a previous sampling. If currently sampled flow rate data exceeds or goes below the limit is regarded as current flow rate value. Signals whose protruding portions show the same trends during a certain number of sampling times (dead time) are identified as flow rate signals.

Example 1: Step Input



(1) Shows 1% response cause of excessive signal beyond the rate limit. However, actual output is under damping that described by a solid line.
(2) Shows the flow rate signal (1%) of just after damping calculation (1) and rate limit value.
(3) This signal is recognized as a flow rate signal since it does not return to within the rate limit value within the dead time.
(4) The output signal follows the damping curve and tracks the step signal.

Example 2: Slurry Noise



Displayed	Description
n03 ⇨ 05. Default: 5(%)	The rate limit value can be set in parameter No. "**n03**". Setting Range: 0 to 10%
n04 ⇨ 00. Default: 0(%) (Rate limit function halt at 0)	The dead time can be set in parameter No. "**n04**". Setting Range: 0 to 15 sec.

6. OPERATION VIA BRAIN TERMINAL (BT200)

Products come equipped with a BRAIN communication function communicate with dedicated BRAIN terminals (BT200) or computer system. In the BRAIN Series communications system, modulated signal is superimposed onto the 4 to 20 mA DC analog signal for data transmission. Since the modulated wave is an AC signal superimposed on the analog signal will cause no error in the DC component of the analog signal. In this way, monitoring can be performed via communications while the ADMAG SE is online.

This section describes the operation procedures using BRAIN terminal. For details on the functions of the ADMAG SE, see Chapter 5, "Function and Data Settings." And also, see the "BT200 Instruction Manual" (IM 1C0A11-01E) for more detailed information.

6.1 BT200 Connections

(1) Connecting BT200 to 4 to 20 mA DC Transfer Line

The communication signal of the ADMAG SE with BRAIN communication function is superimposed onto the 4 to 20 mA DC analog signal to be transferred.

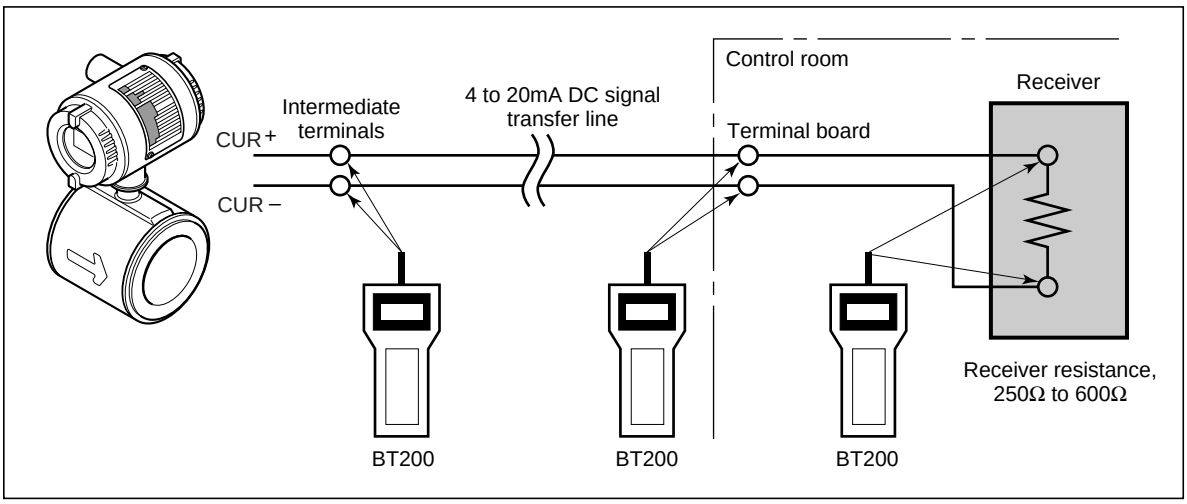


Figure 6.1 Interconnection Diagram

6.2 BT200 Keypad Layout

Figure 6.2 shows the key pad layout of BT200.

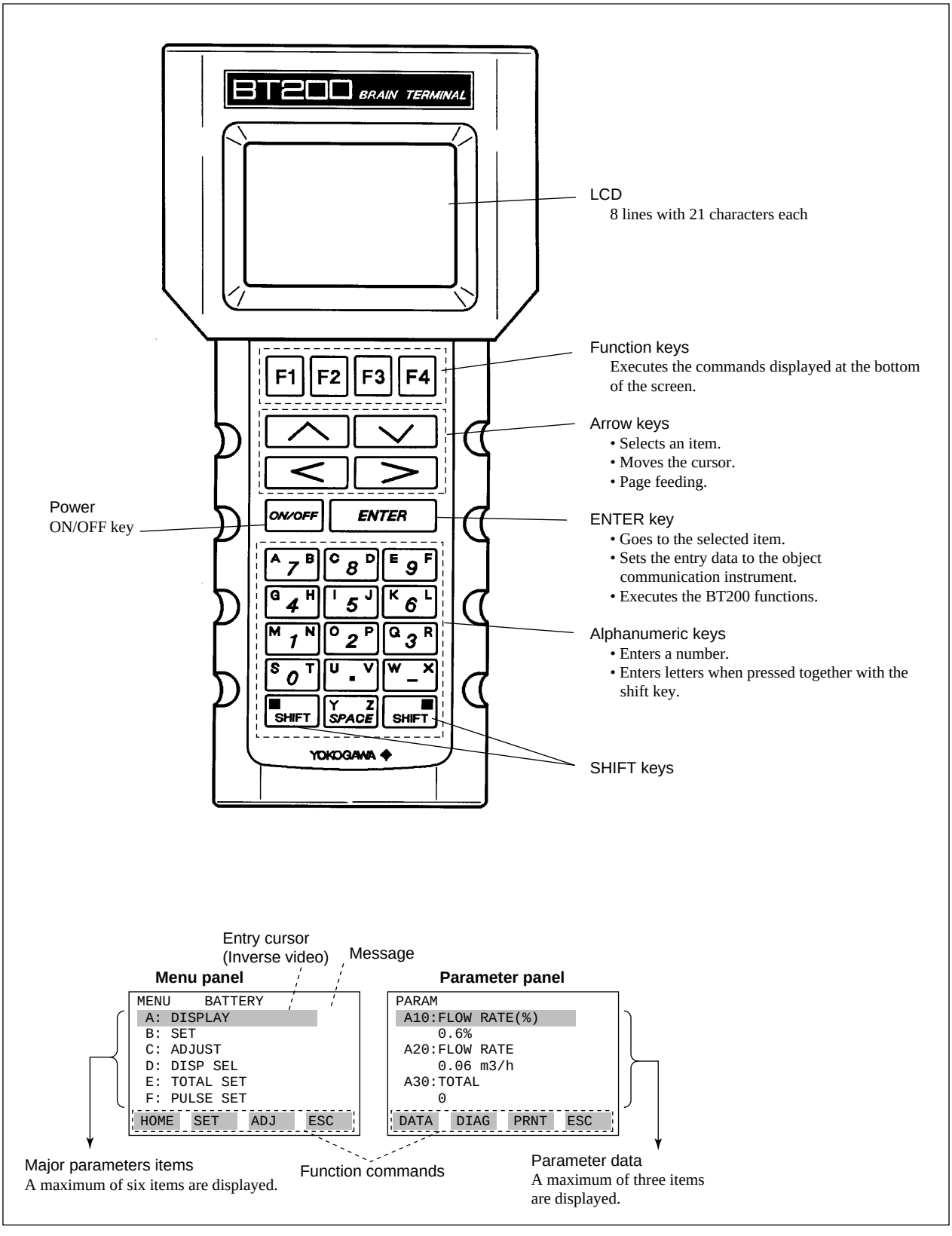


Figure 6.2 Key Layout and Functions

6.3 BT200 Key Functions

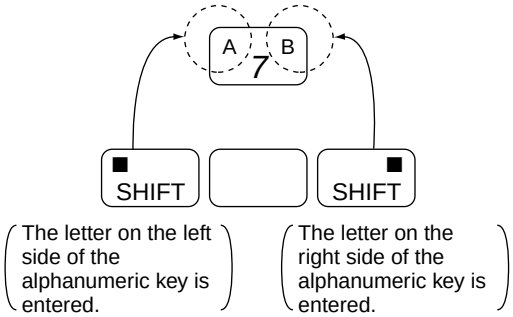
(1) Entry of Alphanumeric Characters

Numbers, codes and letters can be entered in combinations of the alphanumeric keys and the **SHIFT** key.

- **Entry of numbers, codes and a space (0 to 9, ., -, ␣)**
  Entering of them is possible by using the alphanumeric keys.

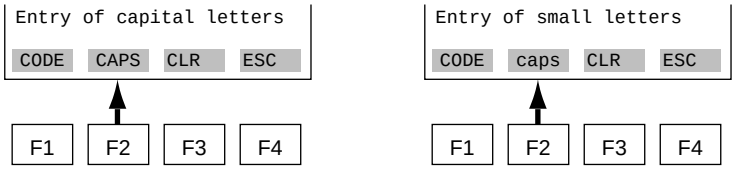
Example of Entry	Key Operation
–4.3	W X – → G H 4 → U V . → Q R 3
1␣ –0.3	M N 1 → Y Z SPACE → W X – → S T 0 → U V . → Q R 3

- **Entry of letters**
  Press an alphanumeric key while one of the **SHIFT** keys is pressed and the letter on the same side of the key as the **SHIFT** key that is pressed can be entered. Press the **SHIFT** key each time when entering a letter.



Example of Entry	Key Operation
WIC	SHIFT → W X – → SHIFT → I J 5 → SHIFT → C D 8
J. B	SHIFT → I J 5 → U V . → SHIFT → A B 7

- **Selection of capital/small letters**
  Capital and small letters can be selected alternately by pressing the function key [F2] (CAPS).

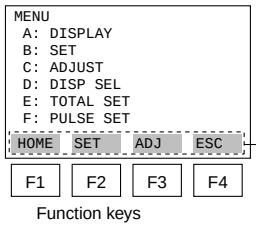


- **Entry of codes**
  Codes can be entered by pressing the function key [F1] (CODE). Every time [F1] CODE is pressed, the codes are displayed at the cursor position in the order shown below.
  / . - , + *) (' & % $ ” !
  To enter characters after the above codes, move the cursor using the [>] key before entry.

Example of Entry	Key Operation
l/m	F2 → SHIFT → W L 6 → F1 → > → SHIFT → W X 1 (Small letter) (l) (/) (m)

(2) Function Keys

The functions of the function keys vary with the commands being displayed on the display panel.



Command	Description
ADJ	Calls up the zero-adjustment menu.
CAPS/caps	Changes the capital/small letter mode.
CLR	Clears entered data/deletes all data.
CODE	See the above “Entry of code.”
COPY*	Prints parameters on the panel.
DATA	Updates parameter data.
DEL	Deletes one character.
DIAG	Calls up the self-check panel.
ESC	Returns to the previous panel.
FEED*	Paper feed.
HOME	Calls up the home menu (A:DISPLAY).
LIST*	Prints all parameters of the menus.
NO	Setting stop/re-setting. Returns to the previous panel.
OK	Goes to the next panel.
PARM	Parameter number setting mode.
PON/POFF*	Printer output of data whose setting was changed Mode on/off.
PRNT*	Changes to the print mode.
SET	Calls up the setting menu. (B:SETTING)
SLOT	Returns to the slot selection panel.
GO*	Starts print out.
STOP*	Stops printing.
UTIL	Calls up the utility panel.

*The command is available only for BT200-P00.

6.4 Displaying Flow Rate Data

Flow rate data can be displayed on the BT200 panel according to the following procedure.

Display	Description
ON/OFF ↓ --WELCOME-- BRAIN TERMINAL ID:BT200 Check cable connection and press the ENT key. UTIL FEED	Turn the power on and the panel as shown on the left appears after “Please wait...” is displayed for a few seconds.
↓ ENTER PARAMETER 01:MODEL SE14-A00 02:TAG NO. 03:SELF CHECK GOOD OK	Pressing the **ENTER** key causes the initial data panel as shown on the left to be displayed. The tag number specified upon ordering has been entered.
↓ F4 or ENTER Inverse video bar MENU A:DISPLAY B:SET C:ADJUST D:DISP SEL E:TOTAL SET F:PULSE SET HOME SET ADJ ESC	Pressing the **F4** key [OK] or the **ENTER** key causes the menu panel as shown on the left to be displayed. Select “**A:DISPLAY**” on the menu screen with the inverse video bar and press the **ENTER** key to make the flow data panel appear.
↓ ENTER PARAM A10:FLOW RATE(%) 0.6 % A20:FLOW RATE 0.06 m3/h A30:TOTAL 0 DATA DIAG PRNT ESC	● A maximum of three data items can be displayed on one panel. ● Data are updated at an interval of 5 seconds. ● The arrow keys, [∧], [∨], [<] or [>], are used for page feeding or item selection.

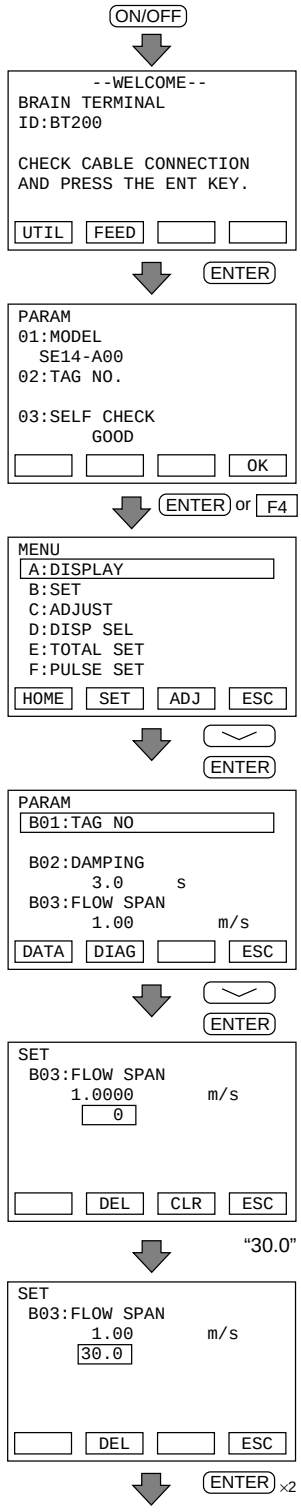
6.5 Setting Parameters

NOTE

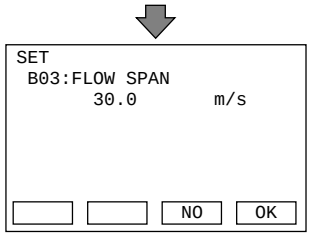
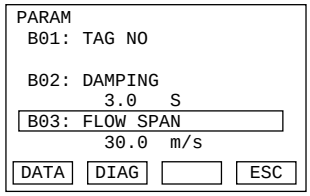
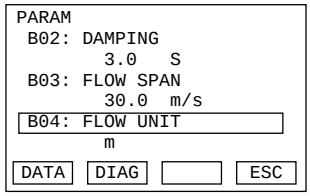
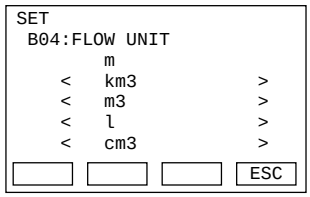
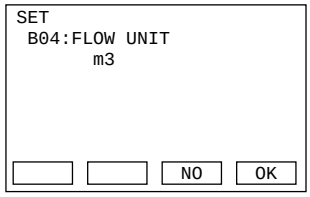
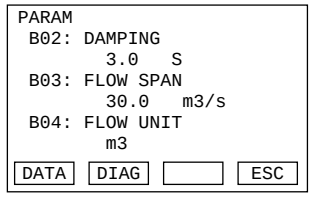
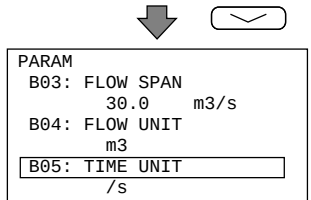
The three parameters must be set to obtain a correct signal.
Nominal size, flow span and meter factor must be set.
In these three factors, nominal size (unit:mm) and meter factor are set before shipment.

6.5.1 Setting Flow Span

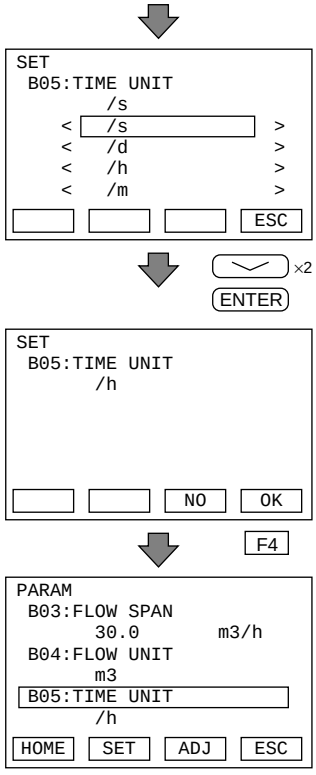
Example: Flow span 30.0 m^3/h

Display	Description
	Turn the power on and the panel as shown on the left appears after "Please wait..." is displayed for a few seconds. Pressing the **ENTER** key causes the initial data panel to be displayed. Pressing the **F4** key or **ENTER** key causes the menu panel to be displayed. Use the arrow key to select "**B:SET**" with the arrow key and press the **ENTER** key. Then, the parameter panel is displayed. Select "**B03:FLOW SPAN**" using the arrow key and press **ENTER** key to call up the following data setup panel. Press **ENTER** key on the parameter panel to display the data setup panel as shown on the left. (If the security panel appears, enter the security code.*) Enter "**30.0**" using the alphanumeric keys. Default:1.0000(m/s) (This **"B03: FLOW SPAN**" is for entering the value, not units.) Press **ENTER** key twice at an interval of a few seconds.

* For entry of the security code, see IM1C0A11-01E.

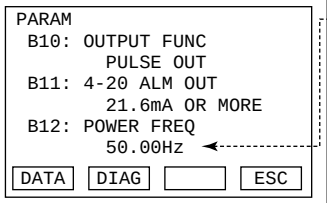
Display	Description
	The display as shown on the left appears.
F4	If the data is correct, press **F4** key [OK].
	The parameter panel is displayed again.
	Select "**B04:FLOW UNIT**" by feeding the page with the arrow key.
ENTER	Press **ENTER** key to display the data setup panel.
	* km^3 : 10^3Xm^3 cm^3 : $(10^{-2}Xm)^3$
ENTER ×2	Select "**m^3**" with the arrow key and press **ENTER** key twice at an interval of a few seconds. Default:m (If the security panel appears, enter the security code.*)
	
F4	If the data is correct, press the **F4** key [OK].
	The parameter panel appears again.
	Select "**B05:TIME UNIT**" by feeding the page with the arrow key.
ENTER	Press the **ENTER** key to call up the data setup panel.

* For entry of the security code, see IM1C0A11-01E.

Display	Description
	Select "**/h**" with the arrow key and press **ENTER** key twice at an interval of a few seconds. Default:s If the data is correct, press the **F4** key [OK]. The parameter panel appears again. The setting is completed.

6.5.2 Power Frequency (For DC version only)

IMPORTANT In case of DC power supply version, setting power frequency is required.

Display	Description
	Set the value in areas where the frequency differs in "**B12:POWER FREQ**". Default: 50.00Hz

6.6 Other Functions

Please set other needed parameters. For detail on the functions, see Chapter 5, "Functions and Settings" except "User-Defined Units" function. For "User-Defined Units" function, see 6.6.1 below.

6.6.1 User-Defined Units

This function displays the instantaneous flow rate indicated in "**A20 FLOW RATE**" in user-defined units.

(1) User-Defined Unit for Instantaneous Flow Rate

Example 1: Displaying the flow rate of a fluid (its specific gravity is 2) in weight (kg) in a flow rate span of 10 m^3/h. When the flow rate is 100%, 20,000 kg/h is displayed.

Display	Description
PARAM D02:FL USER SEL PROVIDED ◄ D03:FL USER SPAN 20000.0 ◄ D10:FL USER UNIT kg/h ◄ DATA DIAG ESC	Select "**PROVIDED**" in "**D02:FL USER SEL.**" Default:NOT PROVIDED In "**D03:FL USER SPAN**" set the value of 100% flow rate to be displayed in "**A20:FLOW RATE**" The user-defined unit is set in "**D10:FL USER UNIT**" Default:100.0
PARAM A10:FLOW RATE(%) 100.0 % A20:FLOW RATE 20000.0 kg/h ◄ A30:TOTAL 0 DATA DIAG PRNT ESC	Set the user-defined unit in "**D10:FL USER UNIT**" The instantaneous flow rate in user-defined unit can be displayed in "**A20:FLOW RATE**"

(2) User-Defined Unit for Totalization Value

User-defined unit can be added to the totalization display in "**A30 TOTAL**"

Display	Description
PARAM E04:TOTAL SET INHIBIT E05:TL SET VALUE 0 E10:TL USER UNIT kg ◄ DATA DIAG ESC	Set the user-defined unit in "**E10:TL USER UNIT**"
PARAM A10:FLOW RATE(%) 100.0 % A20:FLOW RATE 20000.0 kg/h A30:TOTAL 40000kg ◄ DATA DIAG ESC	The totalization value in user-defined unit can be displayed in "**A30:TOTAL**"

6.7 Other Important Points

(1) The automatic power-off function turns the BT200 off automatically with no key access for about 5 minutes or more. However, this function does not operate when the BT200 is displaying "A10:FLOW RATE (%)" or "A20:FLOW RATE"

(2) When "A10:FLOW RATE (%)" or "A20:FLOW RATE" is displayed, the data are updated every 5 seconds.

(3) UPLOAD/DOWNLOAD functions which can copy the setting date between ADMAG SE and BT200 are provided. (For details, see the "BT200 Instruction Manual IM 1C0A11-01E.")
Parameters that can be copied are as follows:
B02 DAMPING, B03 FLOW SPAN, B04 FLOW UNIT, B05 TIME UNIT, B06 SIZE UNIT, B07 NOMINAL SIZE, B10 OUTPUT FUNC, B11 4-20 ALM OUT, D01 DISP SELECT, D02 FL USER SEL, D03 FL USER SPAN, D10 FL USER UNIT, E01 TOTAL UNIT, E02 TOTAL SCALE, E03 TOTAL LOWCUT, E04 TOTAL SET, E05 TL SET VALUE, E10 TL USER UNIT, F01 PULSE UNIT, F02 PULSE SCALE, F03 PULSE LOWCUT, F04 PULSE WIDTH, G01 4-20 LOW CUT, G02 4-20 LOW LMT, G03 4-20 H LMT

7. OPERATION VIA HART COMMUNICATOR

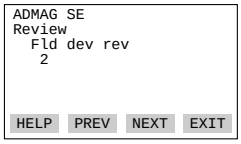
⚠ CAUTION

Matching of communicator DD and instrument DD

Before using model 275 HART communicator, check that the DD(Device Description) installed in the communicator matches to that of instruments to set up. To check the DD in the instrument or the HART communicator, follow the steps below. If the correct DD is not installed in the communicator, you must upgrade the DD at the HART official programming sites. For communication tools other than Model 275 HART communicator, contact vendors of each for upgrade information.

1. Checking the DD in the instrument
   1) Connect the communicator to the instrument to set up.
   2) Call "Device setup" and press [→].
   3) Call "Review" and press [→].
   4) By pressing [NEXT] or [PREV], find "Fld dev rev" to show the DD of the instrument.

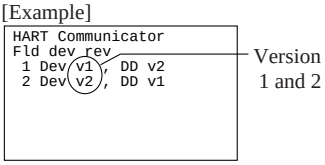
[Example]



"The instrument DD is Version 2"

2. Checking the DD in Model 275 HART communicator.
   1) Turn on the communicator alone.
   2) Call "Utility" from main menu and press [→].
   3) Call "Simulation" and press [→].
   4) Select "YOKOGAWA" from manufacturers list by pressing [↓] and press [→] .
   5) Select the model name of the instrument (i.e. ADMAG SE) by pressing [↓] and press [→] to show the DD of the communicator.

[Example]



"The communicator DD supports Version 1 and 2."

7.1 Conditions of Communication Line

7.1.1 Interconnection between ADMAG SE and HART Communicator

The HART Communicator can interface with the ADMAG SE from the control room, the ADMAG SE site, or any other wiring termination point in the loop, provided there is a minimum load resistance of 230Ω between the connection and the receiving instrument. To communicate, it must be connected in parallel with the ADMAG SE, the connections are non-polarized. Figure 7.1.1 illustrates the wiring connections for direct interface at the ADMAG SE site. The HART Communicator can be used for remote access from any terminal strip as well.

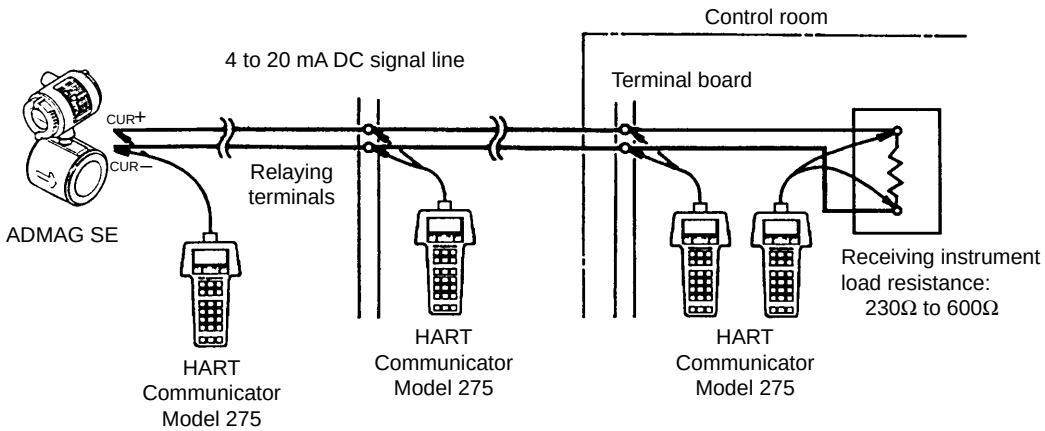


Figure 7.1.1 Interconnection Diagram

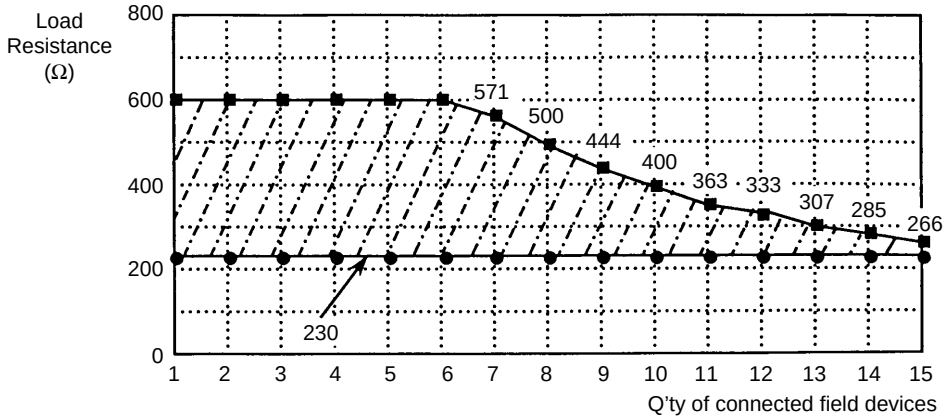
7.1.2 Communication Line Requirements

Specifications for Communication Line:

Load resistance: 230 to 600Ω (including cable resistance)
When multidrop mode, see Figure 7.1.2.
Minimum cable size: 24 AWG, (0.51 mm diameter)
Cable type: Single pair shielded or multiple pair with overall shield
Maximum twisted-pair length: 6,500 ft (2,000 m)
Maximum multiple twisted-pair length: 3,200 ft (1,000 m)
Use the follwing formula to determine cable length for a specific application;

$$L = \frac{65\times10^6}{(R\times C)} - \frac{(C_f+10{,}000)}{C}$$

where: L = length in feet or meters
R = resistance in ohms, current sense resistance
C = cable capacitance in pF/ft or pF/m
C_f = 50,000 pF



* Maximum Load Voltage: 600Ω × 25 mA = 15 V

Figure 7.1.2 Load Resistance and Quantity of Devices in Multidrop Mode

NOTE

The above graph shows the load resistance in case that each current output of all connected transmitters is 4 mA.

7.2 Basic Operation of the HART Communicator (Model 275)

7.2.1 Keys and Functions

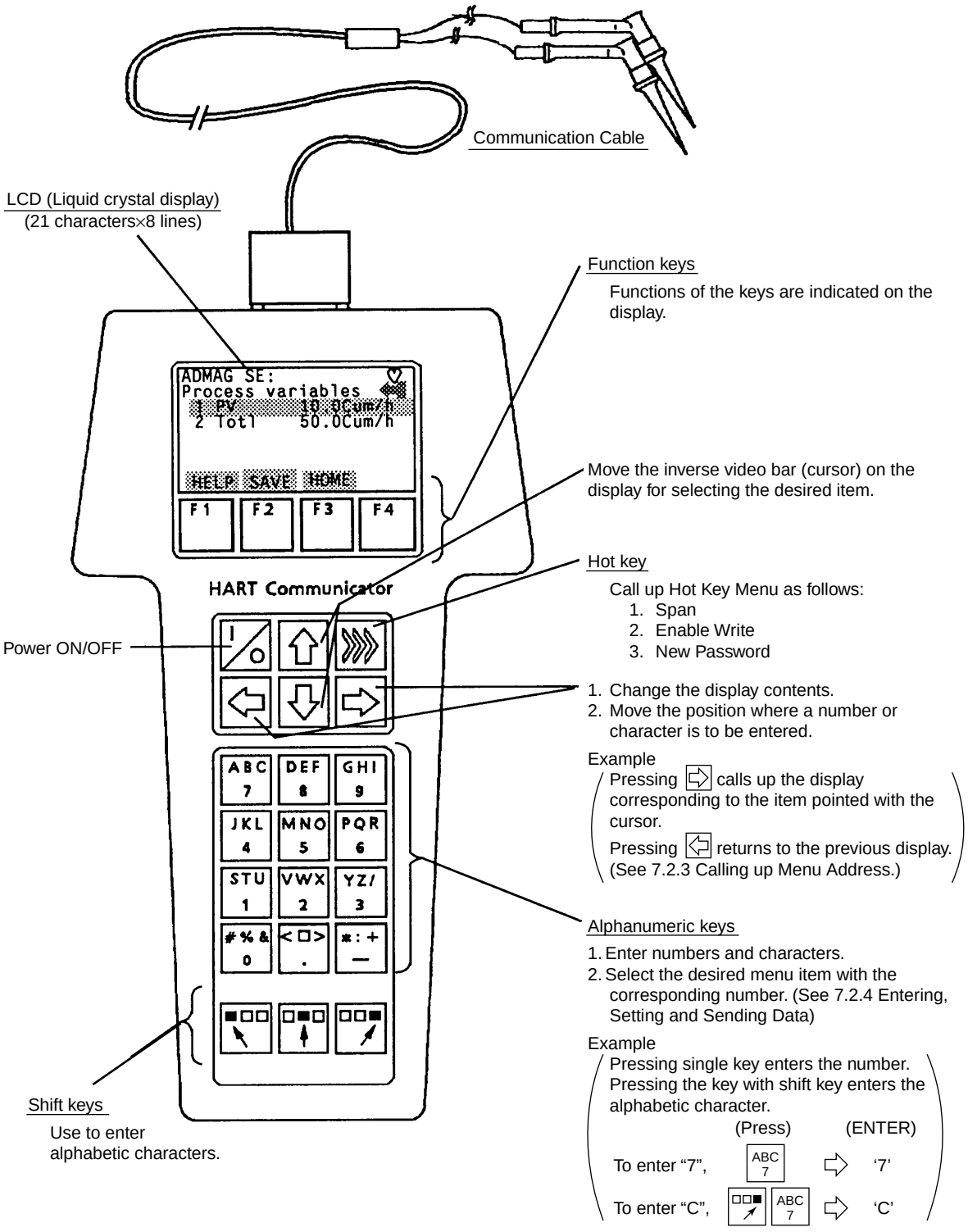


Figure 7.2.1 HART Communicator

7.2.2 Display

The HART Communicator automatically searches for ADMAG SE on the 4 to 20 mA loop when it is turned on. When the HART Communicator is connected to the ADMAG SE, it displays "**Online**" menu as shown below.
(If ADMAG SE is not found, the communicator displays the message "No Device Found. Press OK...." Press the OK 'F4' function key and the main menu appears. Please retry after confirming the connection with the ADMAG SE.)

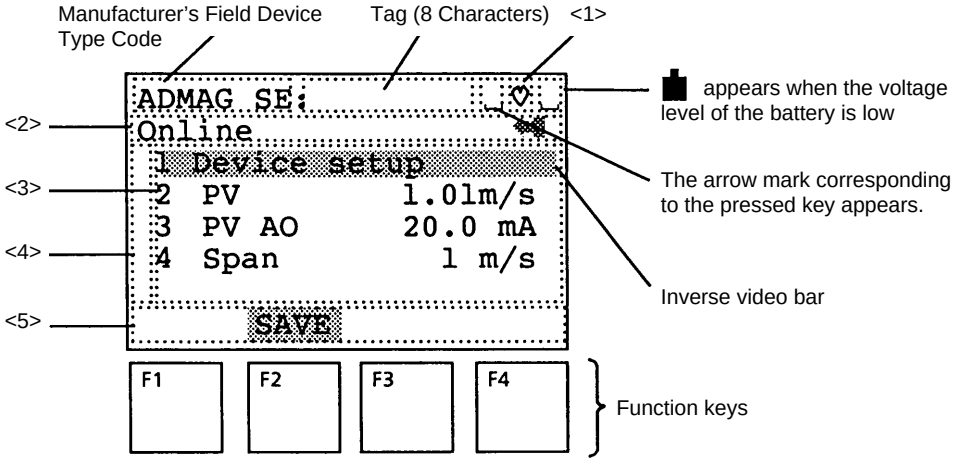


Figure 7.2.2 Display

<1> ♡ appears and flashes during communication between the HART Communicator and the ADMAG SE. At Burst mode*, ♥ appears.
<2> The current display menu title appears.
<3> Each item in menu of <2> appears.
<4> ↓ and/or ↑ appear when the items are scrolled out of the display.
<5> On any given menu, the label appearing above a function key indicates the function of that key for the current menu.

Note: Refer to "7.3.4 Setting Parameters (6) Burst Mode".

7.2.3 Calling Up Menu Addresses

7.3.3 Menu Tree shows the configuration of Online Menu which is needed for the operation with HART Communicator. The desired item can be displayed with ease by understanding the menu configuration.

When the HART Commnicator is connected to the ADMAG SE, "**Online**" menu will be displayed after the power is turned on (See Figure 7.2.2). Call up the desired item as follows:

Key operation

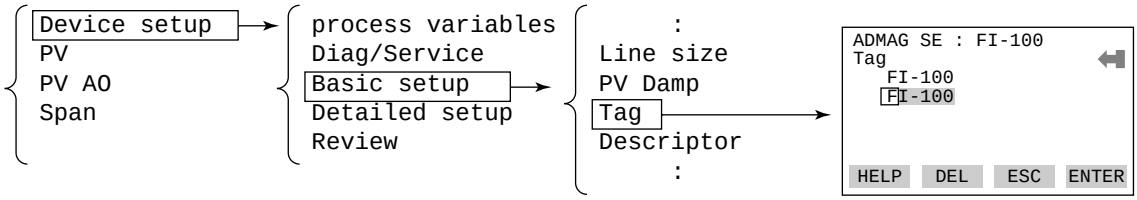
There are two choices to select the desired menu item.

1. Use the ⇩ or ⇧ key to select the desired item, and then press the ⇨ key.
2. Press the number key displayed for the desired item.

- To return to the previous display, press the ⇦ key, **EXIT (F4), ESC (F3)** or **ABORT (F3)**.

Example: Call up the "**Tag**" to change the tag number.

Check where "**Tag**" is located in the menu configuration. Then, call up "**Tag**" on the display according to the menu configuration.



	Display	Operation	
1	ADMAG SE : FI-100 Online 1 Device setup 2 PV 3 PV AO 4 Span	⇨ or STU 1	Display 1 appears when the HART Communicator is turned on. Select "**Device setup**".
2	ADMAG SE : FI-100 Device setup 1 Process variables 2 Diag/Service 3 Basic setup 4 Detailed setup 5 Review SAVE HOME	⇩ ×2 ⇨ or YZ / 3	Select "**Basic setup**".
3	ADMAG SE : FI-100 Basic setup 1 PV Unit 2 Span 3 Nominal size 4 PV Damp 5 Tag HELP SAVE HOME	⇩ ×4 ⇨ or MNO 5	Select "**Tag**".
4	ADMAG SE : FI-100 Tag FI-100 FI-100 HELP DEL ESC ENTER		The display for Tag setting appears. (The default value of "Tag" is blank.)

7.2.4 Entering, Setting and Sending Data

The data which are input with the keys are set in the HART Communicator by pressing **ENTER (F4)**. Then, by pressing **SEND (F2)**, the data are sent to the ADMAG SE. Note that the data are not set in the ADMAG SE if **SEND (F2)** is not pressed. All the data set with the HART Communicator is held in memory unless power is turned off, so every data can be sent to the ADMAG SE at one lot.

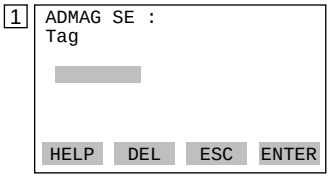
Operation

Entering data on the "**Tag**" setting display.
On alphabetic characters, only capital letters can be used for setting Tag No. with HART Communicator.

Example: Set "**FIC-1A**".
5. Tag

Call up "**Tag**" setting display.

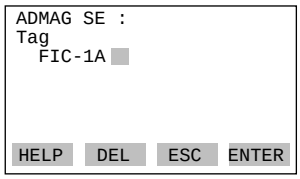
1. Device setup → 3. Basic setup → **5. Tag**



On the setting display shown above, enter the data as follows:

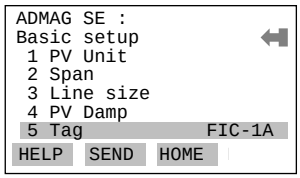
Character to be entered	Operation	Display
F	DEF 8	F
I	GHI 9	F I
C	ABC 7	F I C
-	* : + –	F I C -
1	STU 1	F I C - 1
A	ABC 7	F I C - 1 A

Display **Operation**

1


F4
(ENTER)

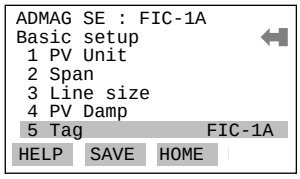
Press **ENTER (F4)** to set the data in the HART Communicator after entering the data.

2


F2
(SEND)

Press **SEND (F2)** to send the data to the ADMAG SE.

* ♡ is flashing during communication.

3


SEND label changed to SAVE label, and the transmission is completed.

Press **HOME (F3)**, and return “Online Menu”.

NOTE Parameter setting on the indicator of ADMAG SE is prohibited during HART Communication.

7.3 Parameters

7.3.1 Parameters Configuration

Parameters of HART Communicator is constructed hierarchically. The menu tree for Online menu is shown in 7.3.3 Menu Tree.

See “Chapter 11. Parameter List” about the usage of each parameter. Note the differences between parameters on ADMAG SE display and those on HART Communicator.

The Online menu summary is shown below.

Table 7.3.1 Online Menu Summary

No.	Display Item	Contents
1	Device setup	Set parameters for ADMAG SE.
2	PV	Display process value in engineering unit.
3	PV AO	Display analog output in mA.
4	SPAN	Display set span in engineering unit.

7.3.2 Data Renewing

There are two methods to load the data of ADMAG SE from/to HART Communicator, periodic data renewing and discretionary data renewing.

(1) Periodic Data Renewing

The follwing data are renewed in 0.5 to 2 seconds cycle.

PV, PV AO, PV % rnge, Totl, Reverse total, Diff. total, Power freq, Velocity check

(2) Discretionary Data Renewing

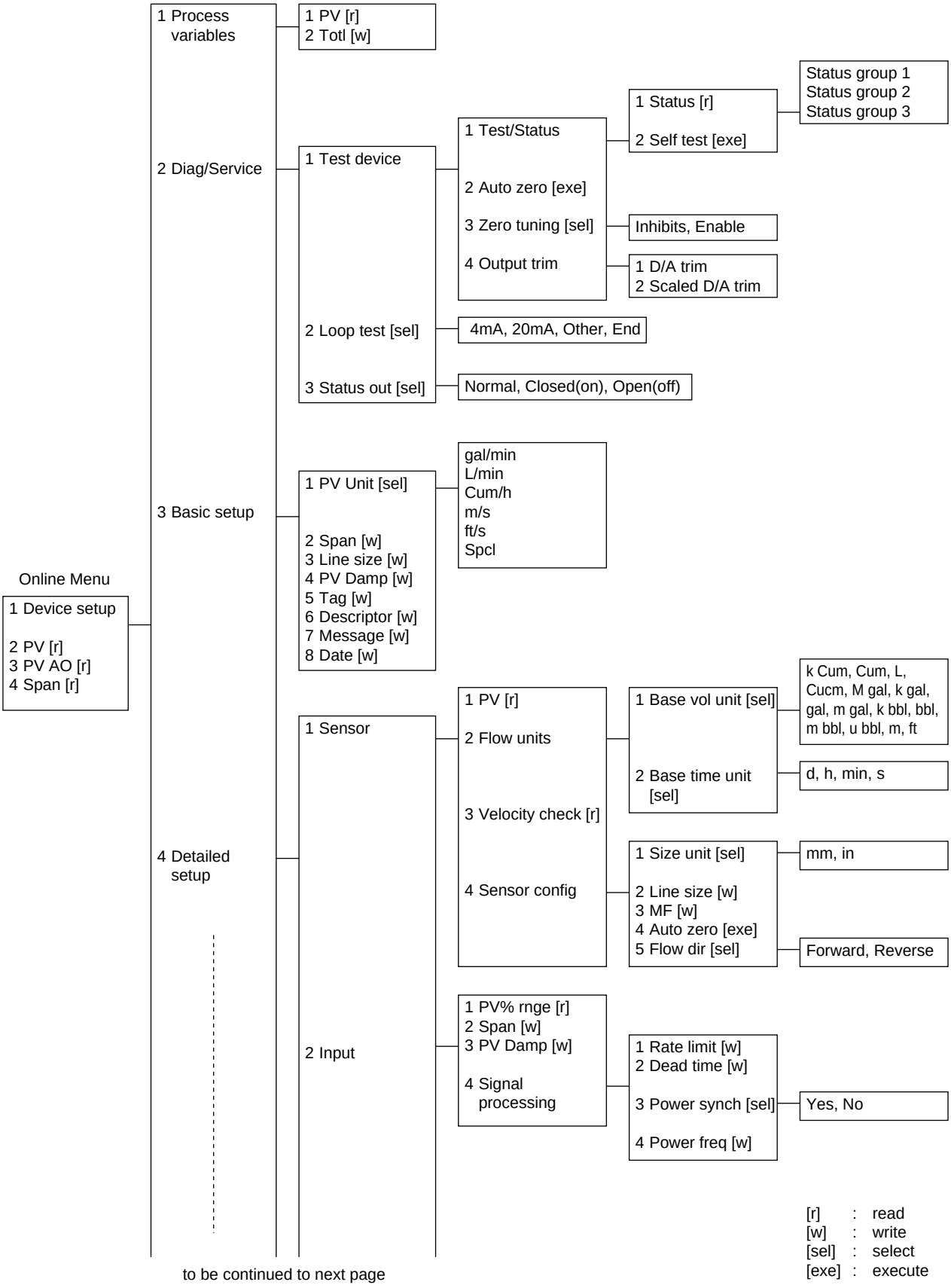
The following data can be loaded from/to ADMAG SE. Up load can be done with **SAVE (F2)** on any online menu, and down load can be done on Saved Configuration menu in Offline menu. (Refer to HART Communicator Manual.)

Descriptor, Message, Date, Tag, Span, Line size, Size unit, PV Damp, Base vol unit, Base time unit, Disp select, Fl user sel, Fl user span, Total unit, Total scale, Total low cut, Tl set value, Total set, Analog low cut, Analog low lmt, Analog hi lmt, Analog alarm out, Output function, Pulse unit, Pulse scale, Pulse low cut, Pulse width.

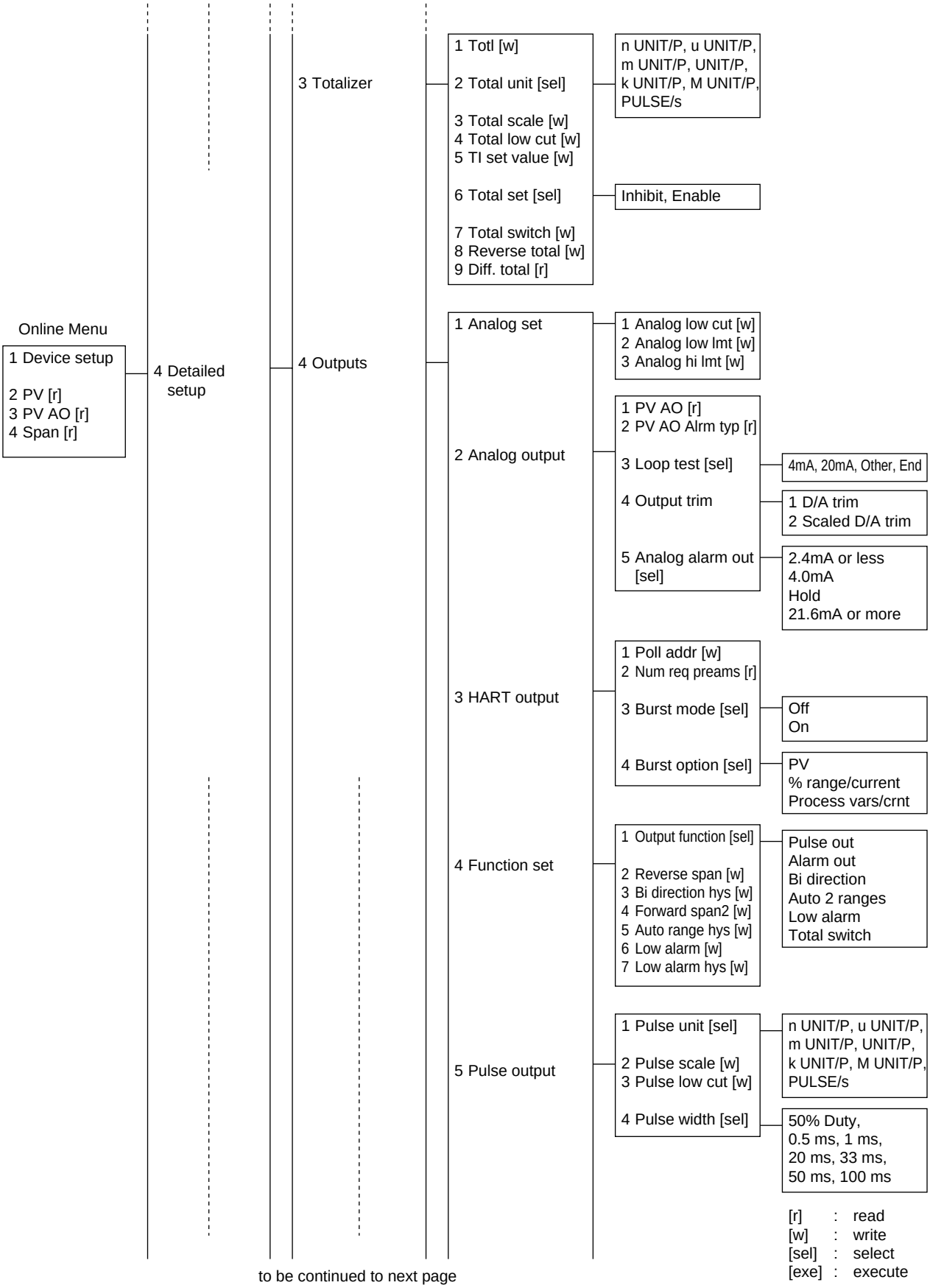
NOTE

The changed data with HART Communicator is sent to ADMAG SE by pressing **SEND (F2)** of HART Communicator.

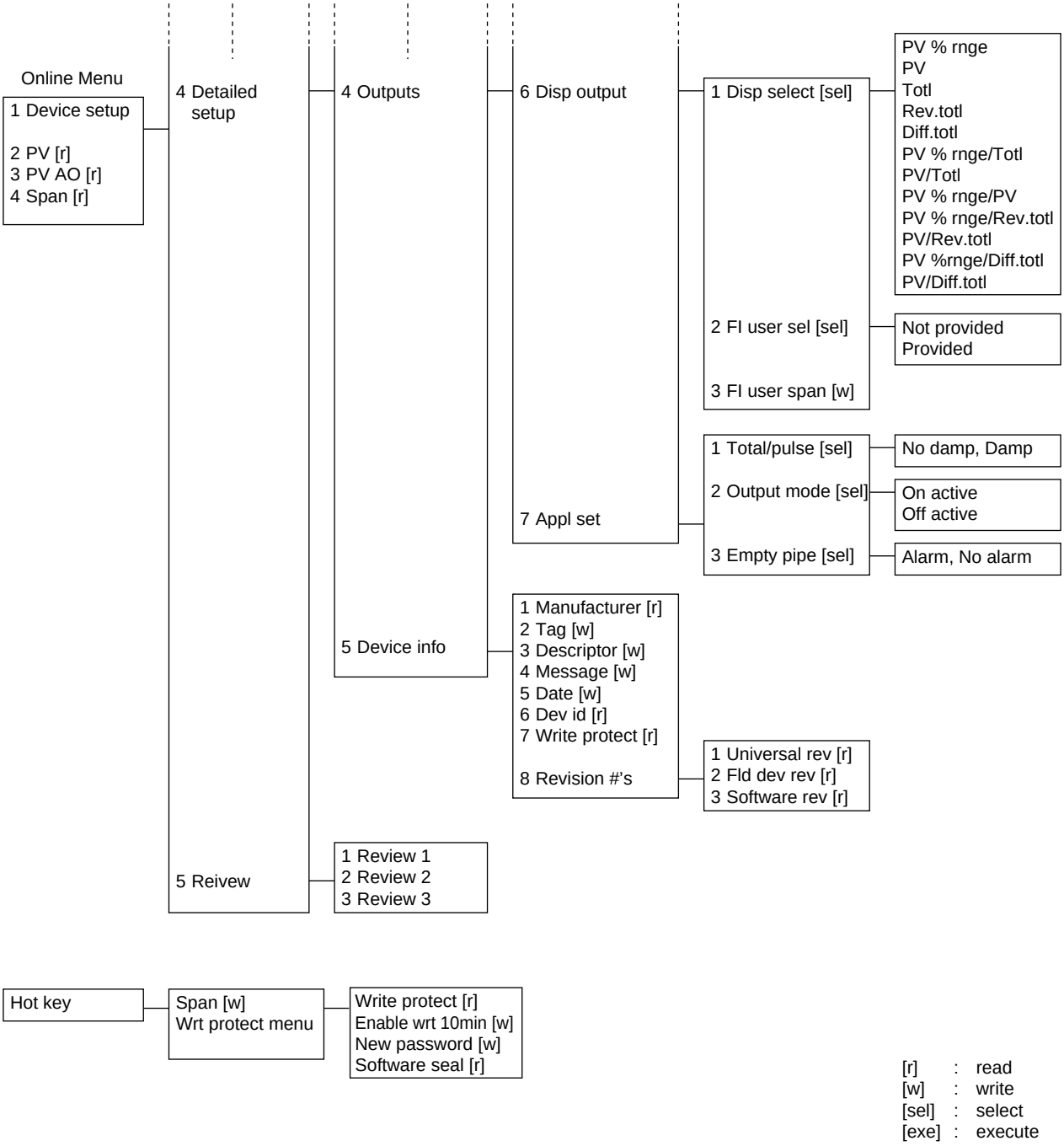
7.3.3 Menu Tree



to be continued to next page



to be continued to next page


Online Menu
1 Device setup
2 PV [r]
3 PV AO [r]
4 Span [r]
4 Detailed setup
4 Outputs
6 Disp output
1 Disp select [sel]
PV % rnge
PV
Totl
Rev.totl
Diff.totl
PV % rnge/Totl
PV/Totl
PV % rnge/PV
PV % rnge/Rev.totl
PV/Rev.totl
PV %rnge/Diff.totl
PV/Diff.totl
2 FI user sel [sel]
Not provided
Provided
3 FI user span [w]
7 Appl set
1 Total/pulse [sel]
No damp, Damp
2 Output mode [sel]
On active
Off active
3 Empty pipe [sel]
Alarm, No alarm
5 Device info
1 Manufacturer [r]
2 Tag [w]
3 Descriptor [w]
4 Message [w]
5 Date [w]
6 Dev id [r]
7 Write protect [r]
8 Revision #'s
1 Universal rev [r]
2 Fld dev rev [r]
3 Software rev [r]
5 Reivew
1 Review 1
2 Review 2
3 Review 3
Hot key
Span [w]
Wrt protect menu
Write protect [r]
Enable wrt 10min [w]
New password [w]
Software seal [r]
[r] : read
[w] : write
[sel] : select
[exe] : execute

7.3.4 Setting Parameters

NOTE	The three parameters must be set to obtain a correct signal. Nominal size, flow span and meter factor must be set. In these three factors, Nominal size (unit:mm) and meter factor are set before shipment.

(1) Span

Example: Set "20.0 Cum /h".

- **1. Base vol unit**
- **2. Base time unit**
- **1. Span**

Call up "**Base vol unit**" setting display.

1. Device setup → 4. Detailed setup → 1. Sensor → 2. Flow units → **1. Base vol unit**

1
```
ADMAG SE :
Flow unit
 m
⇧m bbl
  u bbl
  m
⇩ ft
            ESC  ENTER
```
⇧ ×11 — Select "**Cum**" (m^3).

2
```
ADMAG SE :
Flow unit
 m
⇧Cum
  L
  Cucm
⇩M gal
            ESC  ENTER
```
F4 (ENTER) — Press **ENTER (F4)**.

3
```
ADMAG SE :
Flow units
 1 Base vol unit Cum
 2 Base time unit  s


      SEND  HOME
```
F2 (SEND) — Press **SEND (F2)** to set data to the ADMAG SE.

Call up "**Base time unit**" setting display.

2. Flow units → **2. Base time unit**

1
```
ADMAG SE :
Base time unit
 s
  d
  h
  min
  s
            ESC  ENTER
```
⇧ ×2 — Select "**h**".

2
```
ADMAG SE :
Base time unit
 s
  d
  h
  min
  s
            ESC  ENTER
```
F4 (ENTER) — Press **ENTER (F4)**.

3
```
ADMAG SE :
Flow units
 1 Base vol unit Cum
 2 Base time unit  h


      SEND  HOME
```
F2 (SEND) — Press **SEND (F2)** to set data to the ADMAG SE.

Call up "**Span**" setting display.

Hot key → **1. Span**

1
```
ADMAG SE :
Flow units
 1 Flow unit         Cum
 2 Time unit           h


        SAVE  HOME
```

Press Hot key.

2
```
ADMAG SE :
Hot key
 1 Span          1 Cum/h
 2 Enable Write
 3 New Password


        SAVE
```

Select "Span".

3
```
ADMAG SE :
Span
         1 Cum/h
         1


        DEL  ESC  ENTER
```
'20.0'

Enter "20.0" with alphanumeric keys.

4
```
ADMAG SE :
Span
         1 Cum/h
    20.0


        DEL  ESC  ENTER
```
F4
(ENTER)

Press **ENTER (F4)**.

5
```
ADMAG SE :
Hot key
 1 Span        20.0Cum/h
 2 Enable write
 3 New password


        SEND
```
F2
(SEND)

Press **SEND (F2)** to set data to the ADMAG SE.

Return to the presious display by pressing or .

NOTE

When the span is set in engineering units using the ADMAG SE front panel key switches, consideration should be given to the least significant digit which is to be displayed for all ranges on the rate indicator of the ADMAG SE (parameter A20 FLOW RATE). For example, if the flow rate value is to be displayed to three decimal places, set the span as "20.000" as opposed to "20."

(2) Flow Units

For actual flow unit setting, the following parameters are provided.

<1> "PV Unit"

This parameter can be set only with HART Communicator. The selectable units are shown below.

gal/min, Cum/h, L/min, m/s, ft/s

<2> Combination of "Base vol unit" and "Base time unit"

These parameters can be set with both ADMAG SE and HART Communicator. The selectable units are shown below.

"Base vol unit": k Cum, Cum, L, Cucm, M gal, k gal, gal, m gal, k bbl, bbl, m bbl, u bbl, m*, ft*

* "m" and "ft" can be combined only with /s.

"Base time unit": /d, /h, /min, /s

If the unit undefined in "PV Unit" is set in these parameters, the display of "PV Unit" indicates "Spcl."

(3) Power Frequency (For DC power supply version only)

IMPORTANT In case of DC power supply version, setting power frequency is required.

Example: Set "60.00".

4. Power freq

Call up "**Power freq**" setting display.

1. Device setup → 4. Detailed setup → 2. Input → 4. Signal procesing → **4. Power freq**

1

```
ADMAG SE :
Power freq
 50.00
 50.00

        DEL  ESC  ENTER
```

'60.00'

Enter "60.00" with alphanumeric keys.

2

```
ADMAG SE :
Power freq
 50.00
 60.00

        DEL  ESC  ENTER
```

F4 (ENTER)

Press **ENTER (F4)**.

3

```
ADMAG SE :
Signal processing
 1 Rate limit
 2 Dead time
 3 Power synch
 4 Power freq      60.00

        SEND  HOME
```

F2 (SEND)

Press **SEND (F2)** to set data to the ADMAG SE.

(4) Trim Analog Output

Fine output adjustment is carried out with "**D/A trim**" or "**Scaled D/A trim**".

- **D/A Trim**
  "**D/A trim**" is to be carried out if the calibration digital ammeter does not read 4.000 mA and 20.000 mA exactly with the output signal of 0% and 100%.
- **Scaled D/A Trim**
  "**Scaled D/A trim**" is to be carried out if the output is adjusted using a voltmeter or other types of meters with 0% to 100% scale.

Example 1: For the adjustment using an ammeter (±1uA is measurable.)

Call up "**Output trim**" display.

1. Device setup → 2. Diag/Service → 1. Test device → **4. Output trim**

1
```
ADMAG SE :
Output trim
 1 D/A trim
 2 Scaled D/A trim

HELP  SAVE  HOME
```
⇨

Select "**D/A trim**".

2
```
ADMAG SE :
WARN-Loop should be
removed from
automatic control

          ABORT  OK
```
F4 (OK)

Press **OK (F4)**.

3
```
ADMAG SE :
Connect reference
meter

          ABORT  OK
```
F4 (OK)

Connect the ammeter (±1uA is measurable.), and press **OK (F4)**.

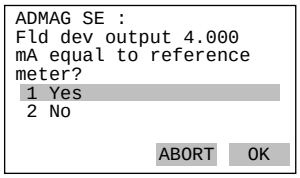
4
```
ADMAG SE :
Setting fld dev
output to 4mA

          ABORT  OK
```
F4 (OK)

Press **OK (F4)**, and the ADMAG SE outputs the output signal of 0%.

5
```
ADMAG SE :
Enter meter value
      4.000

HELP  DEL  ABORT  ENTER
```
'4.115'
F4 (ENTER)

Ammeter reading: 4.115

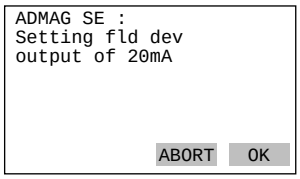
Enter the read value "**4.115**" of the ammeter, and press **ENTER (F4)**.
(The output of the ADMAG SE changes.)

6


F4
(ENTER)

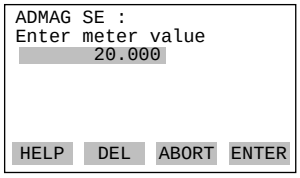
Ammeter reading: 4.000

Because the reading on the ammeter is 4.000 mA, select "**Yes**" and press **ENTER (F4)**.
If the reading is not 4.000 mA, select "**No**".
Repeat step 5 until the ammeter reads 4.000 mA.

7


F4
(OK)

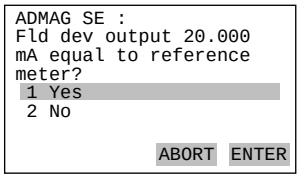
Press **OK (F4)**, and the ADMAG SE outputs the output signal of 100%.

8


'19.050'
F4
(ENTER)

Ammeter reading: 19.050

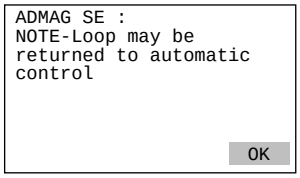
Carry out the same procedures as those described under 5 .

9


F4
(ENTER)

Ammeter reading: 20.000

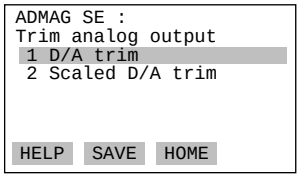
"**Returning fld dev to original output**" appears.

10


F4
(OK)

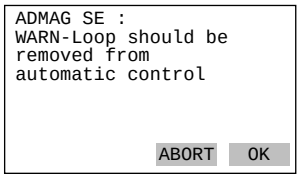
Press **OK (F4)**.

Example 2: For the adjustment using a voltmeter

1


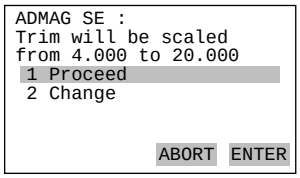
VWX
2

Select the "**Scaled D/A trim**".

2


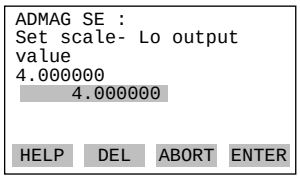
F4
(OK)

Press **OK (F4)**.

3


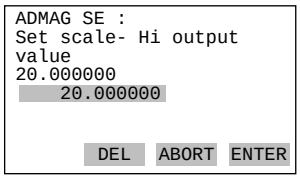
VWX
2

Select "**Change**", and press **ENTER (F4)**.
The same operations as for "**D/A trim**" are required when selecting "**Proceed**".

4


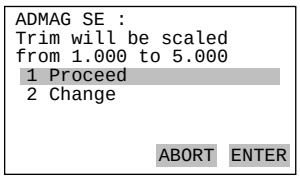
'1'
F4
(ENTER)

Enter the read value on the meter when the signal is 4 mA. In this case, enter the value of the voltage across a 250Ω resistor (1 V), and press **ENTER (F4)**.

5


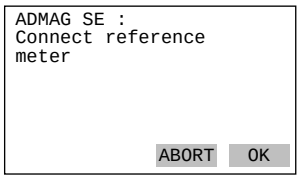
'5'
F4
(ENTER)

Enter the read value on the meter when the signal is 20 mA. Then, enter "**5**" (5 V), and press **ENTER (F4)**.

6


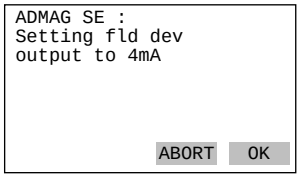
F4
(ENTER)

Select "**Proceed**" and press **ENTER (F4)**.

7


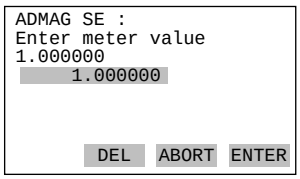
F4
(OK)

Connect the voltmeter, and press **OK (F4)**.

8


F4
(OK)

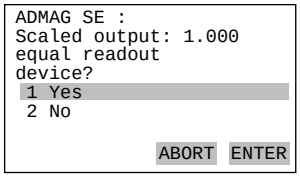
Press **OK (F4)**. The output signal of 0% is output.

9


'1.01'
F4
(ENTER)

Voltmeter reading: 1.010

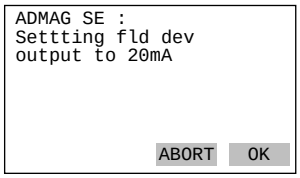
Enter the reading of the voltmeter (1.010), and press **ENTER (F4)**.
(The output of the ADMAG SE changes.)

10


F4
(ENTER)

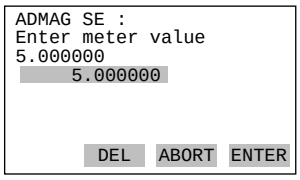
Voltmeter reading: 1.000

Because the reading on the voltmeter is 1.000, select "**Yes**" and press **ENTER (F4)**.
If the reading is not 1.000, select "**No**".
Repeat step 9 until the voltmeter reads 1.000 V.

11


F4
(OK)

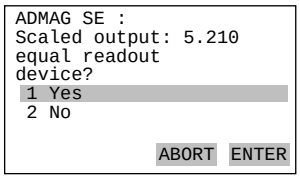
Press **OK (F4)**. The output signal of 100% is output.

12


'5.21'
F4
(ENTER)

Voltmeter reading: 5.210

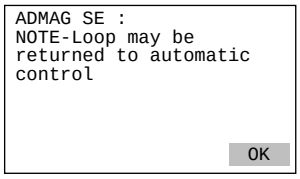
Enter the reading of the voltmeter (5.210), and press **ENTER (F4)**.

13


F4
(ENTER)

Voltmeter reading: 5.000

Select "**Yes**" and press **ENTER (F4)**.
"**Returning fld dev to original output**" appears.

14


F4
(OK)

Press **OK (F4)**.

IMPORTANT D/A trim should be executed only at single range mode. If D/A trim is executed at Bi direction mode, it is feared that the current output becomes 108%.

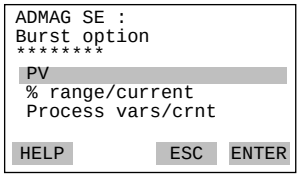
(5) Burst Mode

The ADMAG SE continuously sends the data stored in it when the burst mode is set "On". Either one of instantaneous flow rate, output in %, totalization values and current output can be selected and sent. The data is sent intermittently as a digital signal when the ADMAG SE is set in the burst mode.

Setting of Burst Mode

Call up "**Burst option**" display.

1. Device setup → 4. Detailed setup → 4. Outputs → 3. HART output → **4. Burst option**



F4 (ENTER)

F2 (SEND)

Set the data to be sent.

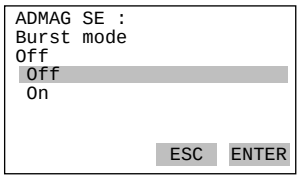
- Instantaneous flow rate (PV)
- Output in % and current output (% range/current)
- Instantaneous flow rate, totalization value* and current output (Process vars/crnt)

  * "Totl", "Reverse total" or "Diff. total"

Call up "**Burst mode**" display.

3. HART output → **3. Burst mode**

1

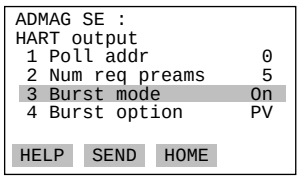


↓

F4 (ENTER)

Set "**ON**" and press **ENTER (F4)**.

2



F2 (SEND)

Press **SEND (F2)**.

Releasing from "Burst Mode"

Call up "**Burst mode**" display, and set "**Off**".

(6) Multidrop Mode

Field devices in multidrop mode refer to the connection of several field devices on a communication single line. Up to 15 field devices can be connected when set in the multidrop mode. To activate multidrop communication, the field device address must be changed to a number from 1 to 15. This change deactivates the 4 to 20 mA output and turns it 4 mA. Refer to Fig. 7.1.2 for the load resistance.

Setting of Multidrop Mode

Call up "**Poll addr**" display.

1. Device setup → 4. Detailed setup → 4. Outputs → 3. HART output → **1. Poll addr**

```
ADMAG SE :
Poll addr
    0
   0

HELP  DEL  ESC  ENTER
```

'1'

F4 (ENTER)

F2 (SEND)

Set the polling address (a number from 1 to 15) and press **ENTER (F4)**.
Then, press **SEND (F2)** to send the data.

Call up "**Auto Poll**" display.

HART output → Online Menu → Main Menu → 4. Utility → 1. Configure Communication → **1. Polling**

1
```
ADMAG SE :
HART output
 1 Poll addr          1
 2 Num req preams     5
 3 Burst mode        On
 4 Burst option      PV

HELP  SAVE  HOME
```

F3 (HOME)

Return to "**Online Menu**" with **HOME (F3)**.

2
```
ADMAG SE :
Online
 1 Device setup
 2 PV           20Cum/h
 3 PV AO           20mA
 4 Span         20Cum/h

      SAVE
```

Return to "**Main Menu**" with a "previous" key.

3
```
HART Communicator
 1 Offline
 2 Online
 3 Frequency Device
 4 Utility
```

JKL 4

Select "**Utility**".

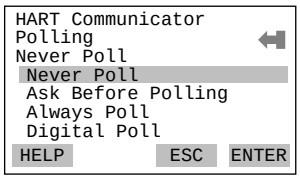
4
```
HART Communicator
Utility
 1 Configure Communic
 2 System Information
 3 Listen for PC
 4 Storage Location
 5 Simulation
```

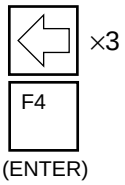
Select "**Configure Communication**".

5
```
HART Communicator
Configure Communicat
 1 Polling
 2 Contrast
 3 Off Time
 4 Ignore diagnostics

HELP
```

Select "**Polling**".

6





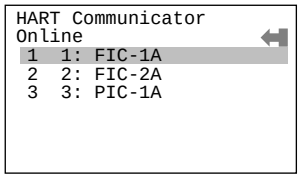
Select "**Digital Poll**" and press **ENTER (F4)**.

NOTE

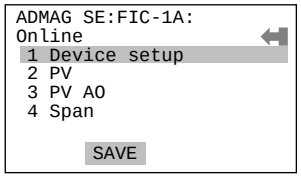
1. If "Never Poll" is set in "Polling" when the address is set, "Online Menu" cannot be called up and displayed. Be sure to set "Digital Poll" in "Polling" after setting the polling address.
2. When the same polling address is set for two or more field devices in multidrop mode, communication with these field devices is disabled.

Example: Communication when set in the multidrop mode.

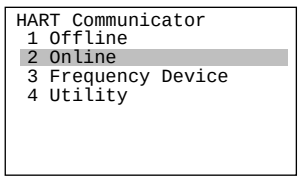
1



2



3



(1) The HART Communicator searches for the field device is set in the multidrop mode when the HART Communicator is turned on.
When the HART Communicator is connected to the field device, the tag will be displayed (display 1).

(2) Select the desired field device. After that, normal communication with the selected field device is possible. However, the communication speed is slow in this case (display 2).

(3) To communicate with another field device, call up display 3, and select "**Online**".

(4) Display 1 will appear. Repeat the above operation.

Releasing from Multidrop Mode

First, call up the "**Poll addr**" display, and set the address to **0**.
Second, call up the "**Polling**" display, and set "**Never Poll**".

NOTE

If the above releasing method is carried out in the reverse order, "Online Menu" can not be called up.

(7) Write Protection

Write protection function is used to prevent unauthorized data being written into the device, ADMAG SE. This function becomes active by entering a password in "New password". Write protection status is released for 10 minutes by entering the password in "Enable wrt 10min".

> **NOTE**
>
> When the write protection function is active, data setting changes in all parameters of the ADMAG SE are inhibited and cannot be changed using either the HART Communicator or the ADMAG SE front panel key switches.

Setting Password

Example: Set the password to "**1 2 3 4**".

Call up "**Wrt protect menu**" in Hot key menu

Hot key → **2. Wrt protect menu** → **3. New password**

1
```
ADMAG SE :
Hot key
 1 Span           1 m/s
 2 Wrt protect menu
```
VWX 2 — Select "**Wrt protect menu**".

2
```
ADMAG SE :
Wrt protect menu
 1 Write protect  No
 2 Enable wrt 10min
 3 New password
 4 Software seal  Keep

HELP  SAVE
```
YZ / 3 — Select "**New Password**".

3
```
ADMAG SE :
Enter new password to
change state of write
protect

        DEL  ABORT  ENTER
```
Set "**1 2 3 4**" and press **ENTER (F4)**.

STU 1, VWX 2, YZ / 3, JKL 4, F4 (ENTER)

4
```
ADMAG SE :
Re-enter new password
within 30 seconds:
 1234
 1234

        DEL  ABORT  ENTER
```
STU 1, VWX 2, YZ / 3, JKL 4, F4 (ENTER) — Set "**1 2 3 4**" again and press **ENTER (F4)**.

5
```
ADMAG SE :
Change to New password
```
"**Write protect**" status changes from "**No**" to "**Yes**".

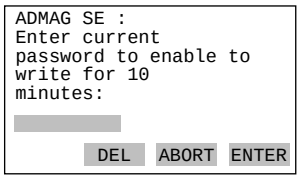
6
```
ADMAG SE :
It changed the state
of protection related
password

                  OK
```
F4 (OK) — Press **OK (F4)**.

Changing Password

Example: Change the password from "**1 2 3 4**" to "**6 7 8 9 A**".

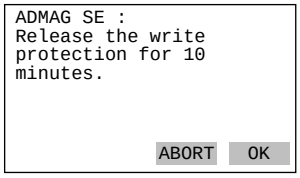
Call up "**Wrt protect menu**" in Hot key menu

Hot key → **2. Wrt protect menu** → **2. Enable wrt 10min**

1


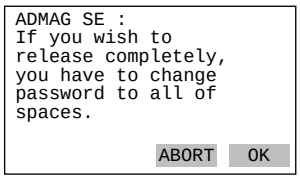
"1 2 3 4"
F4
(ENTER)

Enter the password and press **ENTER (F4)**.

2


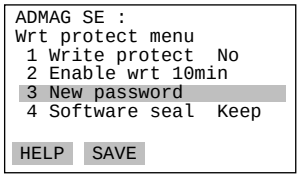
F4
(OK)

Press **OK (F4)**.
Write protection status is released for 10 minutes.

3


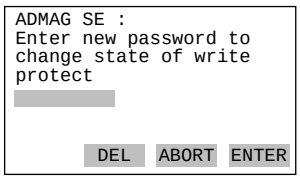
F4
(OK)

Press **OK (F4)**.

4


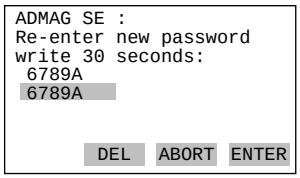
YZ/
3

Select "**New password**".

5


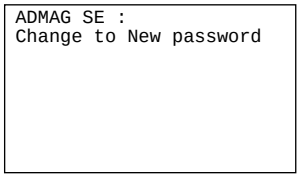
"6 7 8 9 A"
F4
(ENTER)

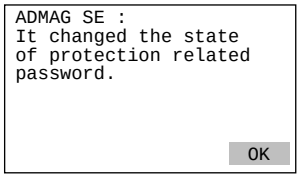
Set "**6 7 8 9 A**" and press **ENTER (F4)**.

6


"6 7 8 9 A"
F4
(ENTER)

Set "**6 7 8 9 A**" again and press **ENTER (F4)**.

7


8


F4
(OK)

Press **OK (F4)**.

NOTE

1. "**Enable wrt 10min**" releases write protection status for 10 minutes. While write protection status is released, it is possible to enter a new password in the "**New password**". It will not be possible when 10 minutes have elapsed.
2. To release write protection status completely, enter 8 spaces in the "New password". This causes "**Write protect**" status to change from "**Yes**" to "**No**".
3. If both ADMAG SE and HART Communicator power off and on again within 10 minutes after releasing of write protection status, the enabled write protection status becomes unavailable.
4. "L01:TUNING" which is the write protection for ADMAG SE front panel key switches, can be set "00:INHIBIT" or "01:ENABLE" only when "Write Protect" on HART Communicator shows "No".

* "Joker password" and "Software Seal"
  When you forget the password that has been registered, it is possible to release the mode for 10 minutes by using a joker password. Enter **YOKOGAWA** to release "**Write protect**" status for 10 minutes. If this joker password is used, the status shown in the parameter "Software seal" is changed from "Keep" to "Break". Press Hot key and select "2. Wrt Protect menu". Current status is shown in "4. Software seal". This status will be returned from "Break" to "Keep" by registering a new password.

(9) Other Functions and Operation

Please set the other needed parameters with the same way. The following document is useful for your operation.

Product Manual for the HART Communicator: MAN 4250

8. ACTUAL OPERATION

After you have installed the flow tube into the process piping, wired the input / output terminals, set up the required parameters and performed the pre-operation zero adjustment, the magnetic flowmeter should output an accurate flow signal from its terminals as soon as the measured fluid begins to flow.
This section describes procedures of zero adjustment and alarms countermeasure.

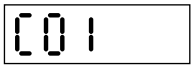
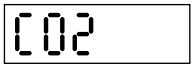
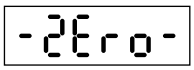
8.1 Pre-Operation Zero Adjustment

This section describes three procedures for performing zero adjustment. Using the data setting keys on the converter front panel, using a BT200 or using a Hart Communicator. Zero adjustment is made to set the instrument output to 0% (4mA) when the flow rate is 0.

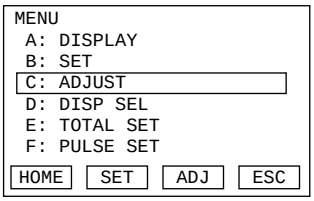
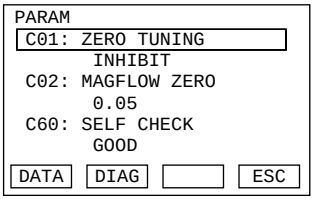
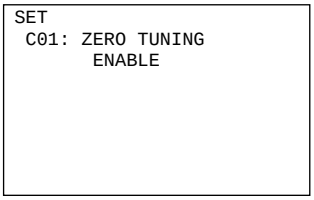
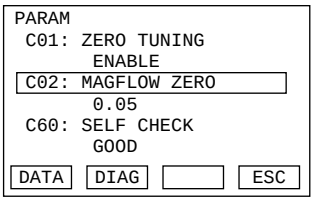
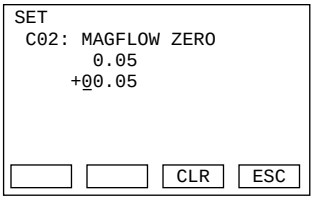
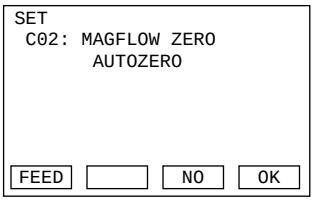
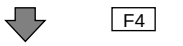
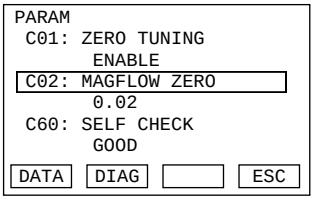
IMPORTANT

1. Zero adjustment should be done only when the fluid is filled in the flow tube and the fluid velocity is completely zero by closing the valve.
2. Zero adjustment should be done prior to the other operation. For 20 seconds during the zero adjustment, any setting cannot be accepted.

8.1.1 Zero Adjustment Using Data Setting Keys

Display	Description
	Call up "**C01**" (ZERO TUNING) on the setting mode and touch **SET** key to make the data display.
SET	
	Set "**01**" and touch **SET** key twice. **Code** / **Content**: 00 INHIBIT; 01 ENABLE
SET ×2	
	Call up "**C02**" (MAGFLOW ZERO) and touch **SET** key.
SET	
	Touch **SET** key twice.
SET ×2	
	"**-ZEro-**" is displayed for about 20 seconds.
	It changes into the Flow Rate Display Mode after the zero adjustment is completed.

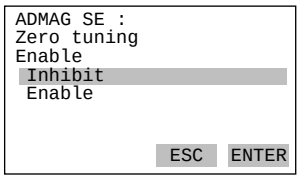
8.1.2 Zero Adjustment Using BT200

Display	Description
	Call up the menu panel and select "**C:ADJUST**" with the arrow key.
	Press **ENTER** key to call up the panel displaying the parameter subitems. Confirm the inverse video bar is on "**C01:ZERO TUNING**".
	Press **ENTER** key to call up the data setup panel and select "**ENABLE**".
	Press the **ENTER** key to set the data and return to the parameter sub items panel. Select "**C02:MAGFLOW ZERO**"with the arrow key.
	Pressing the **ENTER** key causes the data setup panel to be displayed.
	While "**C02:MAGFLOW ZERO**" is displayed, press the **ENTER** key twice at an interval of a few seconds. Then, "**AUTO ZERO**" is now displayed.
	
	After about 20 seconds, pressing the "**F4**" [OK] of the function key causes the menu panel to be displayed. The zero correction is displayed. Then the panel returns to data display mode.

8.1.3 Zero Adjustment Using HART Communicator

Call up "**Zero tuning**" display.

1. Device setup → 2. Diag/Service → 1. Test device → **3. Zero tuning**



F4 (ENTER)

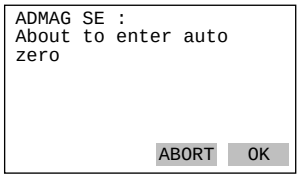
F2 (SEND)

Select "**Enable**" and press **ENTER (F4)** and **SEND (F2)**.

Call up "**Auto zero**" display.

1. Test device → **2. Auto zero**

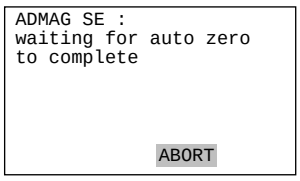
1



F4 (OK)

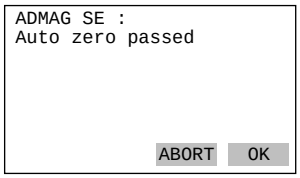
Press **OK (F4)**.

2



Wait for about 20 seconds.

3



F4 (OK)

Press **OK (F4)**.

This parameter is only for execution.

IMPORTANT

1. Zero adjustment should be done only when the fluid velocity is completely zero by closing the valve.
2. Do not turn off the power to the ADMAG SE immediately after zero adjustment. Powering off within 20 seconds after zero adjustment will return adjustment to the previous setting.

8.2 Self-diagnostics Functions

- The self-diagnostics function displays instrument internal errors, input/output signal abnormalities, setting errors, and other problems.
- When an alarm occurs, the alarm number that the error has occurred and normal data are alternately indicated on the indicator of ADMAG SE.
  However, alarms are only displayed during flow rate data display mode and when parameter numbers are being changed in the setting mode. (Alarms are not displayed when data items are being changed.)
- The current output during the alarm occurrence can be selected from among the followings. See "8.2.1 Output Status during Alarm Occurence."
  - 2.4mA or less
  - 4mA
  - HOLD
  - 21.6mA or more
- When the BT200 is used, alarms are displayed in "**A60 to N60:SELF CHECK**" parameter.
- When the HART Communicator is used, alarms are displayed in "**Status group 1 to 3**" parameters. There are two methods for self-diagnostics, every transmission and manually executing the "Self test" command. See "8.2.2 Self-diagnostics Using HART Communicator."
- When an error message appears, follow "8.2.3 Error Description and Countermeasure.".

8.2.1 Output Status during Alarm Occurrence

Display detail			Alarm Contact Output	Current Output	Total/Pulse Output
Indicator of SE	BRAIN Terminal	HART Communicator			
---	GOOD	Self test OK	ON	Normal	Normal
---	ERROR	Error	OFF	Fixed*	Stop
Err-02	uP FAULT	uP fault	OFF	21.6mA or more**	Stop
Err-03	EEPROM FAULT	EEPROM fault	OFF	21.6mA or more**	Stop
Err-05	A/D FAULT	A/D fault	OFF	Fixed*	Stop
Err-06	SIGNAL OVERFLOW	Signal overflow	OFF	Fixed*	Stop
Err-07	COIL OPEN	Coil open	OFF	Fixed*	Stop
Err-08	SPAN VEL.>10m/s	Vel. span>10m/s	OFF	Fixed*	Stop
Err-09	SPAN VEL.<0.3m/s	Vel. span<0.3m/s	OFF	Fixed*	Stop
Err-10	P.SPAN>1000p/s	P.span>1000p/s	OFF	Fixed*	Stop
Err-11	P.SPAN>500p/s	P.span>500p/s	OFF	Fixed*	Stop
Err-12	P.SPAN>25p/s	P.span>25p/s	OFF	Fixed*	Stop
Err-13	P.SPAN>15p/s	P.span>15p/s	OFF	Fixed*	Stop
Err-14	P.SPAN>10p/s	P.span>10p/s	OFF	Fixed*	Stop
Err-15	P.SPAN>5p/s	P.span>5p/s	OFF	Fixed*	Stop
Err-16	P.SPAN<.0001p/s	P.span<.0001p/s	OFF	Fixed*	Stop
Err-17	T.SPAN>1000p/s	T.span>1000p/s	OFF	Fixed*	Stop
Err-18	T.SPAN>.0001p/s	T.span<.0001p/s	OFF	Fixed*	Stop
Err-19	4-20 LMT ERROR	Analog lmt error	OFF	Fixed*	Stop
Err-20	EMPTY PIPE	Empty pipe	OFF	Fixed*	Stop
Err-21	MULTIRANGE ERROR	Multi range err	OFF	Fixed*	Stop
Err-22	COIL SHORT	Excitation failure	OFF	Fixed*	Stop
Err-23	EEPROM NO SET	EEPROM no set	OFF	21.6mA or more**	Stop
Err-24	EEPROM DEFAULT	EEPROM default	OFF	Fixed*	Stop
Err-25	—	Dev id not entered	OFF	Fixed*	Stop

Note) *Depending on the setting in "4-20 ALM OUT (Analog alarm out)".
**When optional code /C1 is selected, current output becomes 2.4mA or less.

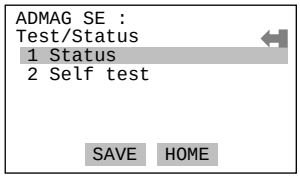
8.2.2 Self-diagnostics Using HART Communicator

Self-diagnostics of the ADMAG SE and check of incorrect data setting can be carried out with the HART Communicator. There are two methods for self-diagnostics of the ADMAG SE, self-diagnostics for every transmission and manually executing the "Self test" command. When an error message appears, follow "8.2.3 Error Description and Countermeasure."

Call up "**Test/Status**" setting display.

1. Device setup → 2. Diag/Service → 1. Test device → **1. Test/Status**

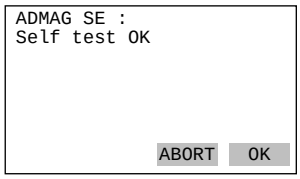
1



VWX 2

Select "**Self test**".

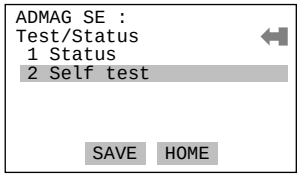
2



F4 (OK)

If there is no error detected, "**Self test OK**" will be displayed. Press **OK (F4)**.
When an error occurs, an error message appears and the results of self-diagnostics appear in the "**Status**".

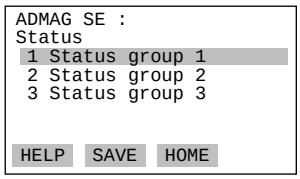
3



STU 1

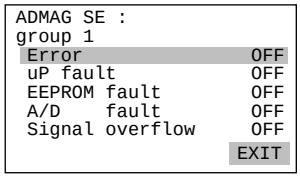
Call up "**Status**".

4



The status menu is separated 3 groups. About items of each group, see "8.2.3 Error Description and Countermeasure".

5



Select the desired group.

If there is no error, the result of diagnostics is indicated as "**OFF**". If "**ON**" is indicated, a countermeasure for that error is necessary.

8.2.3 Error Description and Countermeasure

Display detail				Description	Countermeasure
Indicator of SE	BRAIN Terminal	HART Communicator			
---	GOOD	—	Self test OK	Normal status	—
---	ERROR	Status group 1	Error	Alarm occurrence (At occurrence of error No.2 to 25)	—
Err-02	uP FAULT		uP fault	Microprocessor failure	Contact the nearest Yokogawa office or service center.
Err-03	EEPROM FAULT		EEPROM fault	EEPROM failure	
Err-05	A/D FAULT		A/D fault	A/D converter failure	
Err-06	SIGNAL OVERFLOW		Signal overflow	Excessive input signal	Check the followings: • Mix of the signal, power supply, excitation and other cables • Stray currents in the measured fluid • Incorrect grounding
Err-07	COIL OPEN		Coil open	Flow tube coil open-circuit	Contact the nearest Yokogawa office or service center.
Err-08	SPAN VEL.>10m/s		Vel. span>10m/s	Span velocity setting exceeds 11m/s.	Change settings.
Err-09	SPAN VEL.<0.3m/s		Vel. span<0.3m/s	Span velocity setting is 0.2m/s or less.	
Err-10	P.SPAN>1000p/s	Status group 2	P.span>1000p/s	Pulse output rate exceeds 1100p/s at 50% duty. It exceeds 1000p/s at 0.5ms pulse width.	
Err-11	P.SPAN>500p/s		P.span>500p/s	Pulse output rate exceeds 500p/s at 1ms pulse width.	
Err-12	P.SPAN>25p/s		P.span>25p/s	Pulse output rate exceeds 25p/s at 20ms pulse width.	
Err-13	P.SPAN>15p/s		P.span>15p/s	Pulse output rate exceeds 15p/s at 33ms pulse width.	
Err-14	P.SPAN>10p/s		P.span>10p/s	Pulse output rate exceeds 10p/s at 50ms pulse width.	
Err-15	P.SPAN>5p/s		P.span>5p/s	Pulse output rate exceeds 5p/s at 100ms pulse width	
Err-16	P.SPAN<.0001p/s		P.span<.0001p/s	Pulse output rate is 0.00005p/s or less.	
Err-17	T.SPAN>1000p/s		T.span>1000p/s	Totalization rate exceeds 1100p/s.	
Err-18	T.SPAN>.0001p/s	Status group 3	T.span<.0001p/s	Totalization rate is 0.00005p/s or less.	
Err-19	4-20 LMT ERROR		Analog lmt error	Analog low limit setting exceeds analog high limit setting.	
Err-20	EMPTY PIPE		Empty pipe	Pipe is not filled with fluid or insulating material attached to electrodes.	Fill the flow tube with fluid or clean the flow tube inside.
Err-21	MULTIRANGE ERROR		Multi range err	“Span” setting exceeds “Forward span2” setting at Auto 2 ranges.	Change settings.
Err-22	COIL SHORT		Excitation failure	Excitation circuit failure	Contact the nearest Yokogawa office or service center.
Err-23	EEPROM NO SET		EEPROM no set	Default values have not been set in EEPROM.	
Err-24	EEPROM DEFAULT		EEPROM default	EEPROM has been initialized.	
Err-25	---		Dev id not entered	Device ID has not been entered.	

9. MAINTENANCE

9.1 Loop Test (Test output)

This function enables you to set up any desired value, and to output it from the converter for test. Since this function corresponds to flow rate totalization display and pulse output, this makes it possible to check operation of individual function.
The test functions of status output are also provided.

IMPORTANT

- Test outputs take priority of the flow signal.
  Do not forget to return to the normal operation mode after the loop test.
- In case "BI DIRECTION" is set at OUTPUT FUNCTION (Parameter No. b10), the setting range is available -108 to +108. Please set the loop test value in +/- percentage based on the larger flow span within forward and reverse flow span.
- In case "AUTO 2 RANGES" is set at OUTPUT FUNCTION (Parameter No.b10), the loop test setting value should be set in percentage based on the second range.

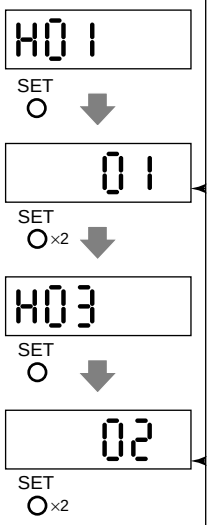
9.1.1 Settings for Test Output Using Data Setting Keys

(1) Current Output (Corresponding to flow rate, totalization display and pulse output value)

Display	Description
H01 SET ○	Call up "**H01**" (TEST MODE) on the setting mode and touch **SET** key to make the data display.
01 SET ○×2	Set "**01**" and touch **SET** key twice.
H02 SET ○	Call up "**H02**" (OUTPUT VALUE) and touch **SET** key.
100.00 SET ○×2	Set the value in % span. (The figure shows a 100% setting.) Flow rate, totalization display and pulse output functions correspond to this set value.
Setting value: –8 (–108) to 108%	

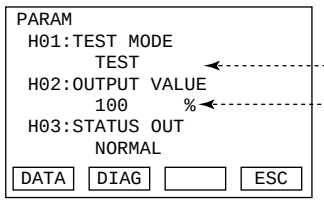
Code	Content
00	Normal operation
01	Test output

(2) Status Output (For status output, alarm output or pulse output)

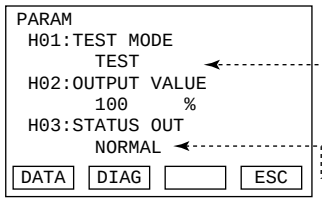
Display	Description
	Call up "**H01**" (TEST MODE) on the setting mode and touch **SET** key to make the data display. **Code** / **Content**: 00 Normal operation; 01 Test output Set "**01**" and touch **SET** key twice. Call up "**H03**" (STATUS OUT) and touch **SET** key. **Code** / **Content**: 00 Normal operation; 01 Contact output status (ON); 02 Contact output status (OFF) Select the output status and touch **SET** key twice.

9.1.2 Setting for Test Output Using BT200

(1) Current Output (Corresponding to flow rate, totalization display and pulse output value)

Display	Description
	Select "**TEST**" in "**H01: TEST MODE**". **Code** / **Content**: **NORMAL** Normal operation; **TEST** Test output Set the value in % of span in "**H02:OUTPUT VALUE**". (The figure shows a 100% setting.) Flow rate, totalization display and pulse output functions correspond to this set value.

(2) Status Output (For status output, alarm output or pulse output status)

Display	Description
	Call up "**H01: TEST MODE**" on the setting mode and select "**TEST**". **Code** / **Content**: **NORMAL** Normal operation; **TEST** Test output Select the status to be output in "**H03: STATUS OUT**". **Code** / **Content**: **NORMAL** Normal operation; **CLOSED(ON)** Contact output status (ON); **OPEN(OFF)** Contact output status (OFF)

9.1.3 Setting for Test Output Using HART Communicator

(1) Loop Test

This feature can be used to output a fixed current from 2.72 mA to 21.28 mA for loop check.

Setting of Loop Test

Example: Set "12mA (50%)" as test output.

2. Loop test

Call up "**Loop test**" display.

1. Device setup → 2. Diag/Service → **2. Loop test**

1
```
ADMAG SE :
WARN-Loop should be
removed from
automatic control

                ABORT  OK
```
F4 (OK)

Set the control loop in manual mode, and press **OK (F4)**.

2
```
ADMAG SE :
Choose analog output
level
 1 4mA
 2 20mA
 3 Other
 4 End
                ABORT  ENTER
```
↓ ×2, F4 (ENTER)

Select "**Other**", and press **ENTER (F4)**.

1. 4mA:
   Outputs a 4mA current signal
2. 20mA:
   Outputs a 20mA current signal
3. Other:
   Sets a desired output with the alphanumeric keys
4. End: Exits

3
```
ADMAG SE :
Output

          4.000

HELP  DEL  ABORT  ENTER
```
'1 2', F4 (ENTER)

Enter "**12**", and press **ENTER (F4)**.

4
```
ADMAG SE :
Fld dev output is
fixed at 12.000 mA

                ABORT  OK
```
F4 (OK)

Press **OK (F4)**.
A fixed current of 12mA is output.

NOTE

1. In case "Bi direction" is set at "Output function", the setting range is available with –108 to +108%. Please set the loop test value in +/– percentage based on the larger flow span within forward and reverse flow span.
2. In case "Auto 2 ranges" is set at "output function", the loop test setting value should be set in percentage based on the second range.

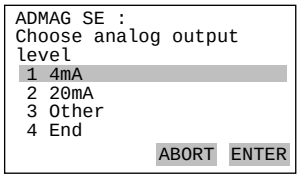
Releasing from Loop Test:

There are four methods which cause the simulated output to return to a normal flow reading.

1. Wait 10 minutes to automatically release from the test mode.
2. Turn the power off to the ADMAG SE.
3. Execute “End”. (See the following for this procedure.)
4. Abort “Loop Test”. **Press ABORT (F3)**.

On “**Loop test**” display.

1

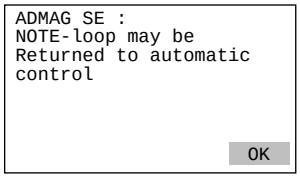


F4

(ENTER)

To finish the loop test, select “**End**”, and press **ENTER (F4)**.

2



F4

(OK)

Press **OK (F4)**.

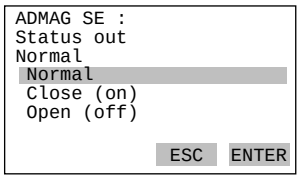
(2) Status Output Test

ADMAG SE has one status output for alarm or other functions. It can be output for test. After the status output test, return the status output parameter to “Normal”.

Call up “**Status out**” display.

1. Device setup → 2. Diag/Service → **3. Status out**

1

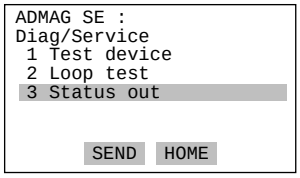


F4

(ENTER)

Select “**Closed**” (example) and press **ENTER (F4)**.

2



F2

(SEND)

Press **SEND (F2)**.

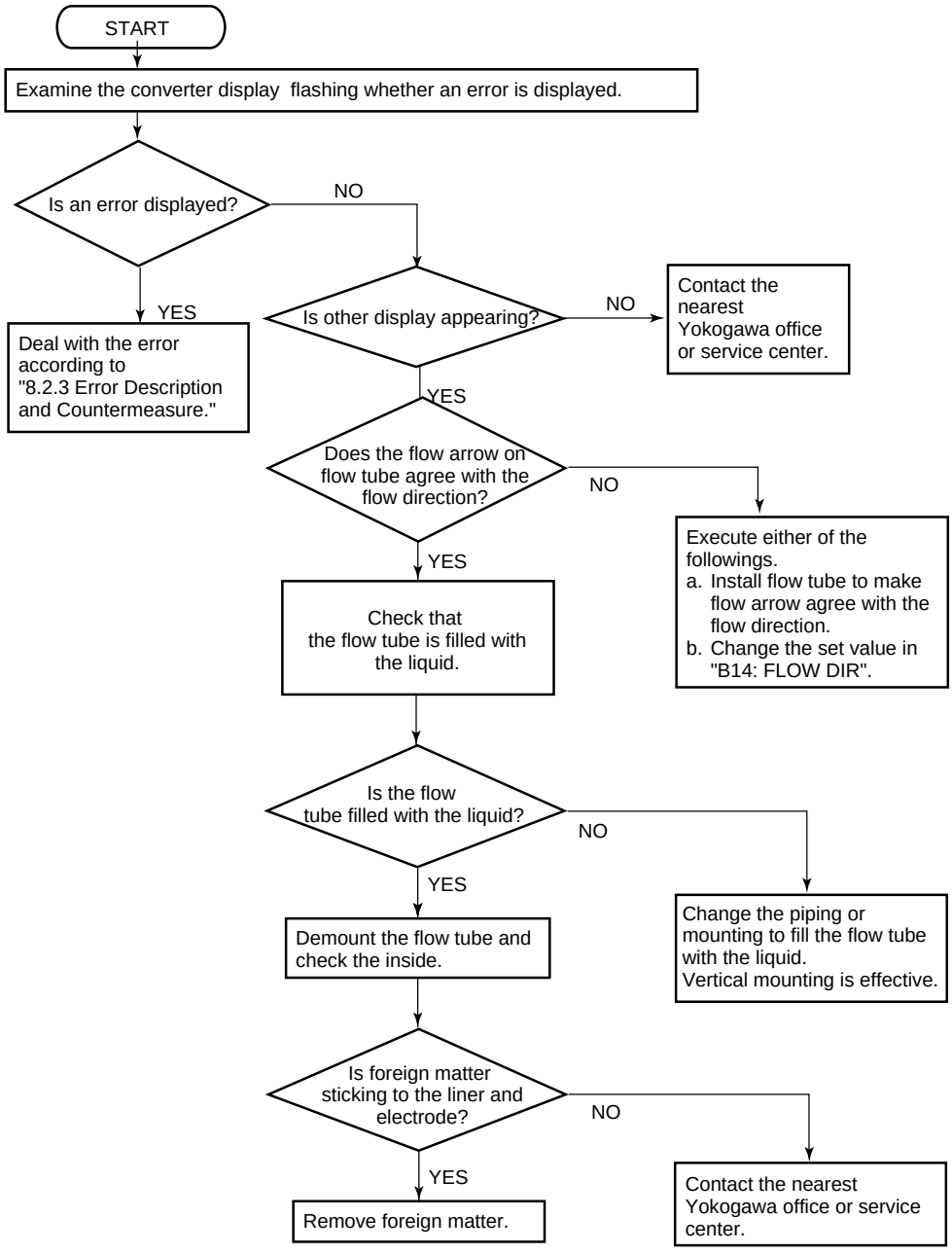
NOTE When the status output test is executed, the current output is fixed 4 mA.

9.2 Trouble Shooting

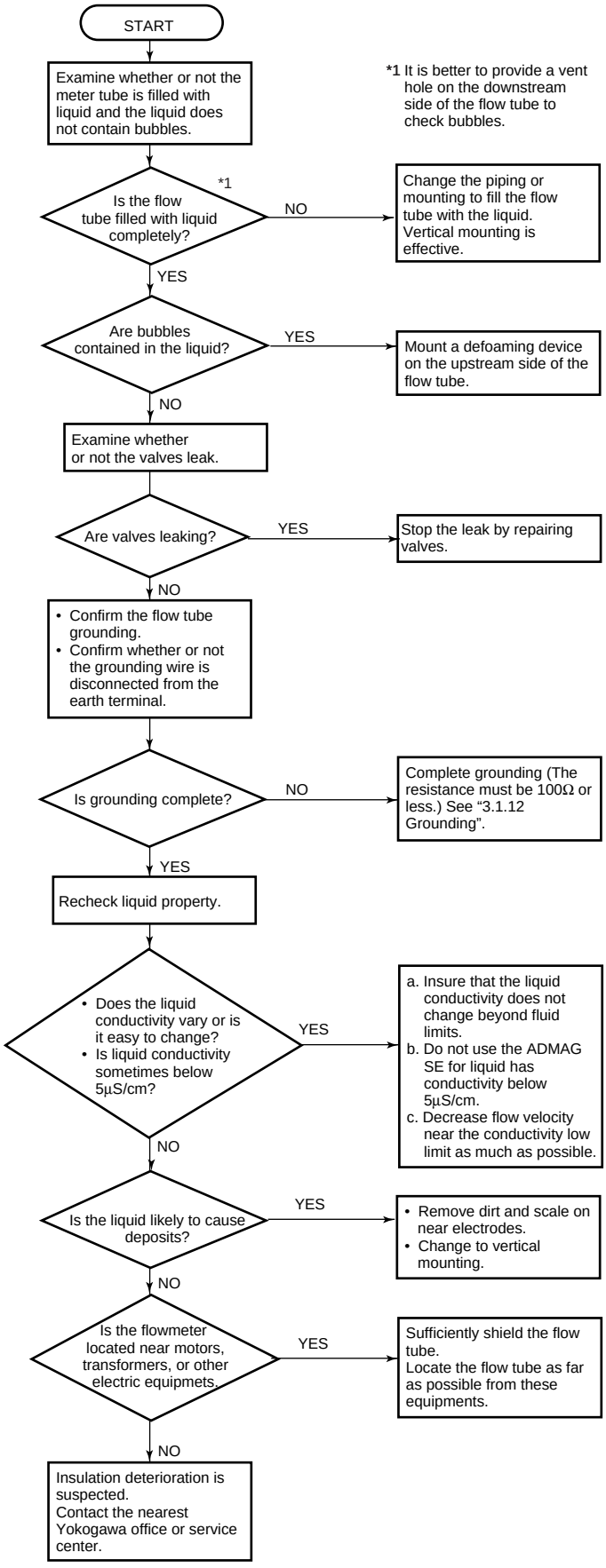
Although magnetic flowmeters rarely require maintenance, failures occur when the instrument is not operating correctly.
The following trouble shooting are described from the viewpoint of receiving instrument indication.

> ⚠ **CAUTION** Please avoid removing the converter unit from the case, replacing fuse and alter LCD orientation. When these procedures are needed, please contact the nearest Yokogawa offce.

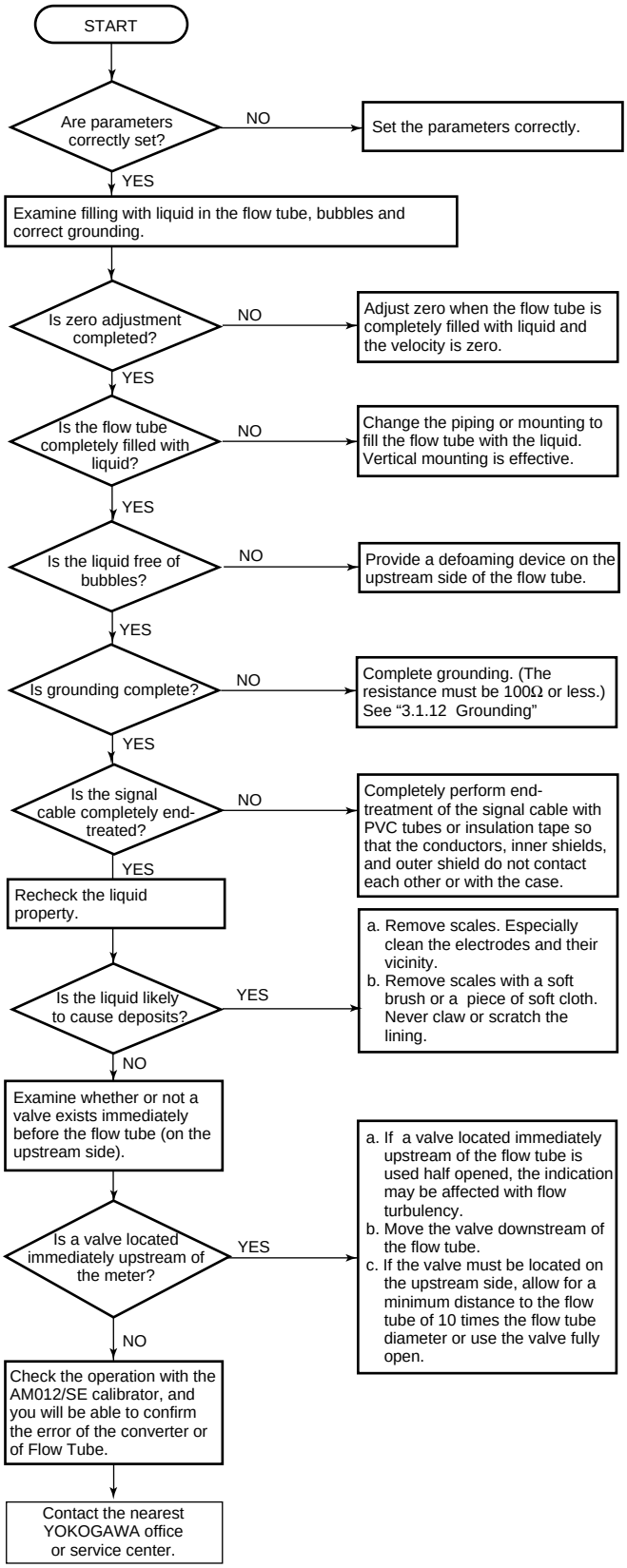
9.2.1 No Indication



9.2.2 Unstable Zero



9.2.3 Disagreement of Indication with Actual Flow Rate



10. OUTLINE

■ STANDARD SPECIFICATIONS

■ Magnetic Flow Converter

Note •For models with no setting switches, a hand-held terminal is necessary to set parameters.
•Pulse output, status output and alarm output use commom terminals, therefore, these functions are not available at the same time.

Excitation method: Pulsed DC excitation

Output Signal:

Current Output: 4 to 20 mA DC
(Load resistance 600Ω maximum)

Transistor Contact Output(Open-collector):
Pulse, alarm or status output selected by parameter setting (Contact rating : 30V DC(OFF), 200mA*(ON))

* In case of FM-Nonincendive type, 135mA

Communication:

HART or BRAIN
(Superimposed on the 4 to 20mA DC signal)

Conditions of Communication Line:

Load Resistance: (including cable resistance)
HART: 230 to 600Ω, depending on q'ty of field devices connected to the loop (multidrop mode)
BRAIN:250 to 600Ω
Load Capacitance: 0.22 μF maximum
Load Inductance: 3.3 mH maximum
Distance from Power Line: 15 cm(0.6 ft) or more (Parallel wiring should be avoided.)
Input Impedance of Receiver Connected to the Receiving Resistance: 10kΩ or larger (at 2.4kHz) (only for HART)
Maximum Cable Length: 2 km* (6500 ft) (when polyethylene-insulated PVC-sheathed control cables (CEV cables) are used)

* In case of FM-Nonincendive type, 1.5km(4875ft)

Instantaneous Flow Rate Display Function:

Flow rate can be displayed either in engineering units or in percent of span. (for models with indicator)

Totalizer Display Function:

Totalized volume in engineering units can be displayed by setting a totalizing factor. (for models with indicator)

Span Setting Function:

Volumetric flow setting is available by setting volume unit, time unit, flow rate value and flow tube size.
Volume Unit: m^3, l, cm^3, gallon(US), barrel(=158.987L)
Velocity Unit: m, ft
Time Unit: sec., min., hour, day
Flow Tube Size: mm, inch

Data Security During Power Failure:

Data storage in EEPROM - no back-up battery required.

Damping Time Constant:

Settable from 0.5 second to 200 seconds. (63% response time)

Pulse Output Function:

Scaled pulse can be output by setting a pulse factor.
Pulse Width: Duty 50% or fixed pulse width (0.5, 1, 20, 33, 50, or 100ms) - user selectable.
Output Rate: 0.0001 to 1000pps (when pulse output function is selected.)

Status Output Function:

One of the followings is selected by parameter setting.

- **Auto 2 Ranges Status Output :** Indicates the selected range for automatic dual range function.
- **Forward and Reverse Status Output :** Indicates the flow direction for forward and reverse flow measurement mode.
- **Totalization Status Output :** Indicates that the internal totalized value exceeds the set value.
- **Low Limit Alarm :** Indicates that flow rate under the low limit set value.

Alarm Output Function :

Indicates that an alarm occurs (Normal Close Fixed).

Self Diagnostics Function:

Converter failure, flow tube failure, erroneous setting, etc. can be diagnosed and displayed (for models with indicator).

Touch Control:

Parameter setting operation by infrared switches. (for models with indicator and setting switches)

Electrical Connection:

ANSI 1/2NPT female, DIN Pg13.5 female, ISO M20 X 1.5 female, JIS G1/2 female

Terminal Connection: M4 size screw terminal

Case Material: Aluminum alloy

Coating: Polyurethane corrosion-resistant coating
Deep sea moss green (Munsell 0.6GY3.1/2.0)

Protection: IP67, NEMA 4X, JIS C0920 water tight type

■ Magnetic Flow Tube

Protection: IP67, NEMA 4X, JIS C0920 water tight type

Size in mm (inch):

15 (0.5), 25 (1), 40 (1.5), 50 (2), 80 (3), 100 (4), 150 (6), 200 (8)

Coating:

Polyurethane corrosion-resistant coating,
Deep sea moss green (Munsell 0.6Y3.1/2.0)
- All sizes of carbon steel flange type
- 150 and 200 mm of wafer type

No coating
- 15 to 100mm of stainless steel flange type
- 15 to 100mm of wafer type

Flow Tube Material:

Size 15 to 100mm (0.5 to 4in.)
Housing: Stainless steel (15mm:SCS11, 25 to100mm:SUS304)
Mini-flange for wafer conn.: Stainless steel (SUS430)

Flange: Carbon steel (SS400) or stainless steel (SUS304)
Pipe: Stainless steel (15 to 25mm: SCS13, 40 to 100mm: SUS304)
Size 150 to 200mm (6 to 8in.)
Housing: Carbon steel (SS400)
Mini-flange for wafer conn.: Carbon steel (SS400)
Flange: Carbon steel (SS400) or stainless steel (SUS304)
Pipe: Stainless steel (SUS304)

Wetted Part Material :

Lining : Fluorocarbon PFA
Electrode : Stainless steel (SUS316L), Hastelloy C (equivalent to Hastelloy C-276), Titanium, Tantalum, Platinum-iridium, Tangsten Carbide.
Earth Ring : Stainless steel (SUS316), Hastelloy C (equivalent to Hastelloy C-276), Titanium, PFA lining+Earth-electrode(Tantalum/Platinum-Iridium)

Note : Hastelloy is a registered trademark of Haynes International Inc.

Gasket :

- VALQUA#4010 ; Fluoro rubber, viton (between flow tube body and earth ring; for optional code /FRG)
- Non-asbestos joint sheet sheathed with fluoro resin PTFE (between earth ring and process flange; for optional code /BSF)

Other gaskets between flow tube and earth ring;

- VALQUA#4010(Mixing#RCD970) ; Alkari resistance gasket for PVC piping(Fluoro rubber)
- VALQUA#4010(Mixing#RCD470) ; Acid resistance gasket for PVC piping(Fluoro rubber)

Contact YOKOGAWA office. (Refer to TI 1E6A0-06E)

Electrode Construction: External insertion type.

■ STANDARD PERFORMANCE

SE***DJ/EJ+SE14(Up to 300m cable length)

Accuracy :

Size in mm (inch)	Span in m/s (ft/s)	Accuracy
15 to 400 (0.5 to 16)	0.3 to 1 (1 to 3)	0.5% of span
	1 to 10 (3 to 33)	0.25% of span (at indications below 50% of span)
		0.5% of rate (at indications 50% of span or more)

T01.EPS

Repeatability: 0.1% of flowrate (1mm/s minimum)

Maximum Power Consumption:

10W for combination of flow tube and converter

Insulation Resistance:

- 100MΩ between power terminals and ground terminal at 500V DC.
- 100MΩ between power terminals and each output terminal at 500V DC.
- 20MΩ between each output terminal and ground terminal at 100V DC.

Withstand Voltage:

- 1500V AC between power terminals and ground terminal for 1 minute. (for -A1/A2 power supply)
- 500V AC between power terminals and ground terminal for 1 minute. (for -D1 power supply)

⚠ CAUTION

When performing the Voltage Breakdown Test, Insulation Resistance Test or any unpowered electrical test, wait 10 seconds after the power supply is turned off before removing the housing cover. Be sure to remove the Short Bar at terminal "G". After testing, return the Short Bar to its correct position. Screw tightening torque should be 1.18N-m(0.88ft-lb)or more, because the G-terminal is thought as a protective grounding and should conform to the Safety Requirements.

Safety Requirement Standard:

IEC1010, EN61010

EMC Conformity Standard:

EN61326
EN61000-3-2, EN61000-3-3
AS/NZS 2064

Grounding: 100Ω or less

*In case of explosion proof type, the protective grounding must be connected to a suitable IS grounding system.

■ NORMAL OPERATING CONDITION

Ambient Temperature: -20 to 60 °C (-4 to 140 °F)

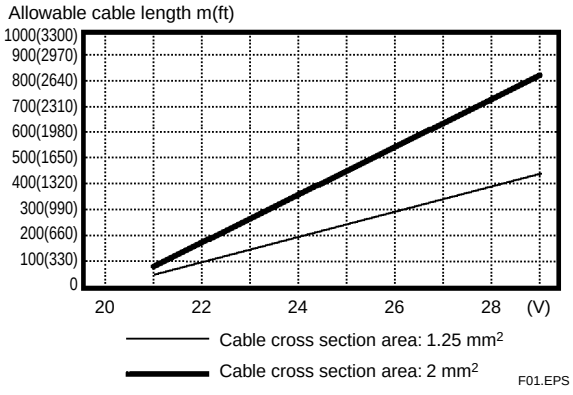
Note: The minimum temperature is -10°C (14°F) in case of the 40mm or lager sizes with the carbon steel flange connection or wafer connection.

Ambient Humidity: 5 to 95%RH (no condensation)

Rated Power Supply Voltage:

100V AC/DC Version:
Range 80 to 127V AC, 47 to 63Hz
90 to 110V DC
230V AC Version: Range 180 to 264V AC
24V DC/AC Version:
Range 20.4 to 28.8 V DC/AC

Supplied Power and Max. Cable Length for 24V DC version:



F01.EPS

Altitude at installation side:

Max.2000m above sea level

Installation category based on IEC1010:

II (See Note)

Pollution level based on IEC1010: 2(See Note)

Note: • The "Installation category" implies the regulation for impulse withstand voltage. It is also called the "Overvoltage category"."II" applies to electrical equipment.

• "Pollution level" describes the degree to which a solid, liquid or gas which deteriorates dielectric strength is adhering. "2" applies to a normal indoor atmosphere.

Fuse: 2A 250V (Time-Lag type)

Fluid Conductivity: 5μS/cm or larger

Measurable Flow Rate Range:

SI Units (Size:mm, Flowrate:m³/h)

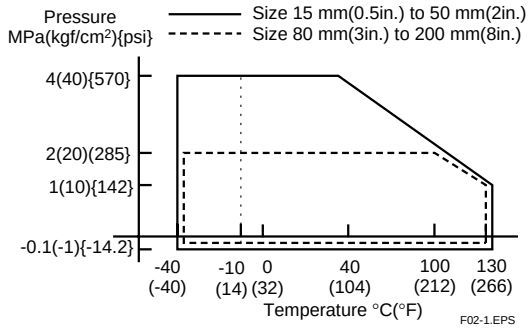
Size	MIN. Range @0.3m/s	MAX. Range @10m/s
15	0.1909	6.361
25	0.5302	17.671
40	1.3572	45.23
50	2.1206	70.68
80	5.429	180.95
100	8.483	282.74
150	19.086	636.1
200	33.93	1,130.9

English Units (Size:in., Flowrate:GPM)

Size	MIN. Range @1.0ft/s	MAX. Range @33ft/s
0.5	0.6024	20.078
1	2.4095	80.31
1.5	5.422	180.70
2	9.638	321.2
3	21.685	722.8
4	38.56	1,285.0
6	86.74	2,891.3
8	154.21	5140

T02.EPS

Fluid Temperature and Pressure:



F02-1.EPS

Note 1: This limits show maximum allowable fluid pressure for Flow Tube itself. Further fluid pressure should also be limitted according to flange rating.

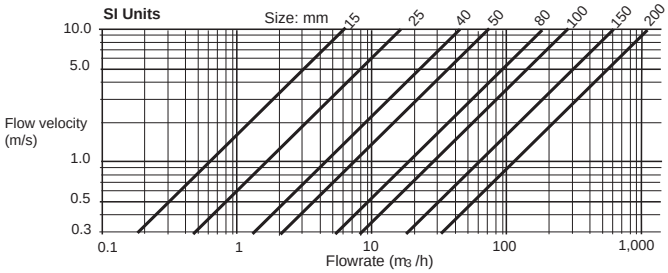
Note 2: The minimum temperature is -10°C (14°F) in case of the 40mm or lager sizes with the carbon steel flange connection or wafer connection.

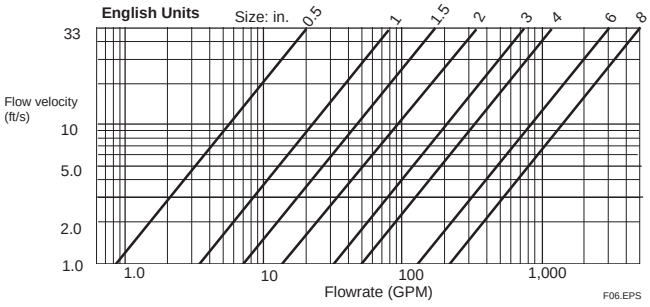
■ TERMINAL CONNECTION

Terminal Symbols	Description
G POWER N- POWER L+	Ground and power supply
CUR+ CUR-	Current output 4 to 20 mA DC
PLS/ALM+ PLS/ALM-	Pulse, alarm or status output
⏚	Protective grounding

T03-3.EPS

■ SIZING DATA





F06.EPS

■ MODEL AND SUFFIX CODE

Integral Type Magnetic Flowmeter:

Model	Suffix Code	Description
SE115		Nominal Size 15 mm (1/2in.)
SE202		Nominal Size 25 mm (1in.)
SE204		Nominal Size 40 mm (1 1/2in.)
SE205		Nominal Size 50 mm (2in.)
SE208		Nominal Size 80 mm (3in.)
SE210		Nominal Size 100 mm (4in.)
SE215		Nominal Size 150 mm (6in.)
SE220		Nominal Size 200 mm (8in.)
Construction	M	Integral type for General Purpose
	N	Integral type for Explosion Proof
Aux. Code	J	Always J
Output Signal	-D	4-20 mA and Pulse or Alarm, Simultaneous 2-output (BRAIN)
	-E	4-20 mA and Pulse or Alarm, Simultaneous 2-output (HART)
Lining	A	Fluorocarbon PFA
Process Connection	B1S	ANSI 150 Wafer
	B2S	ANSI 300 Wafer
	E1S	DIN PN10 Wafer Only for 200 mm (Note 1)
	E2S	DIN PN16 Wafer Only for 80 to 200 mm (Note 1)
	E4S	DIN PN40 Wafer Only for 15 to 50 mm (Note 1)
	K1S	JIS 10K Wafer
	K2S	JIS 20K Wafer
	A1C	ANSI 150 Flange Carbon Steel (SS400)
	A2C	ANSI 300 Flange Carbon Steel (SS400)
	D1C	DIN PN10 Flange Carbon Steel (SS400), Only for 200 mm (Note 1)
	D2C	DIN PN16 Flange Carbon Steel (SS400), Only for 80 to 200 mm (Note 1)
	D4C	DIN PN40 Flange Carbon Steel (SS400), Only for 15 to 50 mm (Note 1)
	J1C	JIS 10K Flange Carbon Steel (SS400)
	J2C	JIS 20K Flange Carbon Steel (SS400)
	G1C	JIS F12 Flange Carbon Steel (SS400), Only for 80 to 200 mm
	A1S	ANSI 150 Flange Stainless Steel (SUS304)
	A2S	ANSI 300 Flange Stainless Steel (SUS304)
	D1S	DIN PN10 Flange Stainless Steel (SUS304), Only for 200 mm (Note 1)
	D2S	DIN PN16 Flange Stainless Steel (SUS304), Only for 80 to 200 mm (Note 1)
	D4S	DIN PN40 Flange Stainless Steel (SUS304), Only for 15 to 50 mm (Note 1)
	J1S	JIS 10K Flange Stainless Steel (SUS304)
	J2S	JIS 20K Flange Stainless Steel (SUS304)
	G1S	JIS F12 Flange Stainless Steel (SUS304), Only for 80 to 200 mm
Electrode Material	-L	Stainless Steel (SUS316L)
	-P	Platinum-iridum
	-H	Hastelloy C276 Equivalent
	-T	Tantalum
	-V	Titanium
	-W	Tungsten Carbide
Earth ring and Earth electrode Material	N	Non Earth Ring
	S	Stainless Steel (SUS316)
	P	Platinum-iridum Electrode
	H	Hastelloy C276 Equivalent
	T	Tantalum Electrode
	V	Titanium
Electrical Connection (Refer to Note2)	0	JIS G1/2 Female
	2	ANSI 1/2NPT Female
	3	DIN Pg13.5 Female
	4	ISO M20X1.5 Female
Power Supply	-A1	80 to 127 V AC/90 to 110 V DC
	-A2	180 to 264 V AC
	-D1	20.4 to 28.8 V DC/AC
Indicator	NN	Non Indicator
	H1	With Horizontal Indicator
	H2	With Horizontal Indicator and Setting SW
	V1	With Vertical Indicator
	V2	With Vertical Indicator and Setting SW
Optional Code	/□	

Note 1: Select PN40 when PN10, PN16, PN25 is required for 15 to 50mm, and select PN16 when PN10 is required for 80 to 150mm, because of same mating dimensions.

Note 2: Only ANSI1/2NPT electrical connection is available for FM or CSA explosion proof type. JIS G1/2 electrical connection is not available for any explosion proof type.

T04.EPS

Optional Specification

A: Available N: Not available

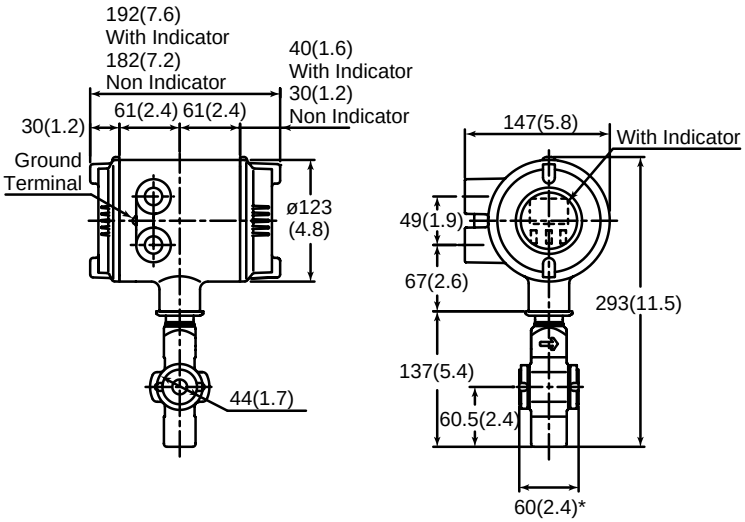
Item	Specification	Applicable Model						Code
		General			Ex-proof			
		SE***MJ	SE14	SE***DJ	SE***NJ	SE14	SE***EJ	
Waterproof Glands	Waterproof glands are attached to all wiring ports. For JIS G1/2 only.	A	A	A	N	N	N	/ECG
Waterproof Glands with Union Joints	Waterproof glands (unionf joints) are attached to all wiring ports. For JIS G1/2 only.	A	A	A	N	N	N	/ECU
Gaskets for PVC Pipe	Gaskets are attached between earth ring and flow tube. Only for size 15 to 200mm	A	N	A	A	N	A	/FRG
Bolt & Nut Assembly	Stainless steel bolts/nuts and non-asbestos PTFE-wrapped gaskets assembly for wafer type Available with 15 to 200mm(0.5 to 8in.)	A	N	A	A	N	A	/BSF
For District Heating and Cooling (For District Cooling)	Condensation proof for DHC use. Only for size 100 to 400mm Terminal box; urethane resin potting. Wired 30m signal cable at factory.	N	N	A	N	N	N	/DHC
DC Noise Suppression	Eliminating DC Noise (Size 15mm(0.5in.) or larger: Conductivity 50μS/cm or higher.)	N	A	N	N	A	N	/ELC
Burn Out Down	Current output at CPU failure is set to "Downward(2.4mA DC or less)". Without /C1 : Upward(21.6mA or more)	A	A	N	A	A	N	/C1
Lightning Protector	Built-in Lightning Protector	A	A	N	A	A	N	/A
Painting Color Change	Black, Munsell code : N1.5	A	A	A	A	A	A	/P1
	Jade Green, Munsell code : 7.5BG4/1.5	A	A	A	A	A	A	/P2
	Metallic Silver	A	A	A	A	A	A	/P7
Epoxy Coating	Coating is changed to epoxy coating.	A	A	A	A	A	A	/X1
High Anti-corrosion Coating	Coating is changed to three-layer coating. (Urethane coating on two-layer Epoxy coating)	A	A	A	A	A	A	/X2
Oil-prohibited Use	Degreased cleansing treatment	A	N	A	A	N	A	/K1
Oil-prohibited Use with Dehydrating Treatment	Degreased cleansing treatment and packed with desiccant	A	N	A	A	N	A	/K5
180 deg. Rotated Converter	180 deg. rotated converter for reversed flow direction	A	N	N	A	N	N	/CRC
Material Certificate(Note 1)	Reproduced material certificate for pipe, electrode, earth ring, mini-flange, and flange (depends on spec.).	A	N	A	A	N	A	/M01
Hydrostatics Test Certificate	With the following water pressure for 10min. The result is filled in Note column of our standard certificate. JIS10K, ANSI Class 150, DIN PN10 : 1.5MPa, JIS20K, ANSI Class 300, DIN PN16 : 3.0MPa, JIS F12 : 1.25MPa	A	N	A	A	N	A	/T01
Calibration Certificate	Level 2:Declaration and Calibration Equipment List	A	A	A	A	A	A	/L2
	Level 3:Declaration and Primary Standard List	A	A	A	A	A	A	/L3
	Level 4:Declaration and YOKOGAWA Measuring	A	A	A	A	A	A	/L4
CENELEC ATEX(KEMA)	Explosion Proof EExdm[ia]IICT6...T3;GroupII Category 2G	N	N	N	A	N	N	/KF2
Explosion Proof Type	Explosion Proof EExdIICT6;GroupII Category 2G	N	N	N	N	A	N	
(Only for size 15 to 200mm)	Explosion Proof EExdm[ia]IICT6...T3;GroupII Category 2G	N	N	N	N	N	A	
FM Explosion Proof Type	Explosion Proof	N	N	N	A	N	A	/FF1
(Only for size 15 to 200mm)	Explosion Proof/Nonincendive	N	N	N	N	A	N	/FF1/FN1
CSA Explosion Proof Type (Only for size 15 to 200mm)	Explosion proof	N	N	N	A	N	A	/CF1
SAA Explosion Proof Type	Explosion Proof Exdm ia IICT6...T3	N	N	N	A	N	N	/SF1
(Only for size 15 to 200mm)	Explosion Proof ExdIICT6	N	N	N	N	A	N	
	Explosion Proof Exdm ia IICT6...T3	N	N	N	N	N	A	
GOST Certification	Calibration Certificate for GOST (only for products produced at YMF)	A	A	A	A	A	A	/GOS

T09.EPS

■ EXTERNAL DIMENSION

15 mm (0.5 in) Wafer Type

Unit : mm(inch)



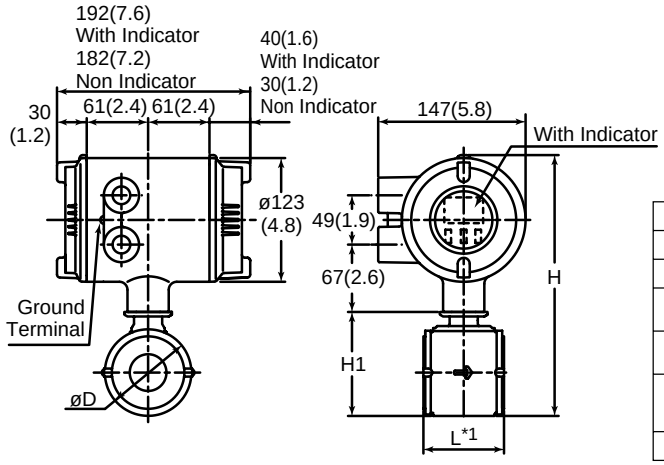
Lining : Fluorocarbon PFA
Weight: 3.3kg(7.3 lb)
With Indicator Option: Add 0.22kg(0.49lb)

* When no earth ring is selected the face to face length is shorter by approx. 1.6 mm(0.06 in).

The face to face length is longer by approx. 22 mm(0.87 in) for earth ring(P,T).

The face to face length is longer by approx. 8.4mm(0.33 in) for optional code /FRG.

25 mm (1 in) to 100 mm (4 in) Wafer Type



*1 When no earth ring is selected the face to face length is shorter by approx. 1.6 mm(0.06 in).

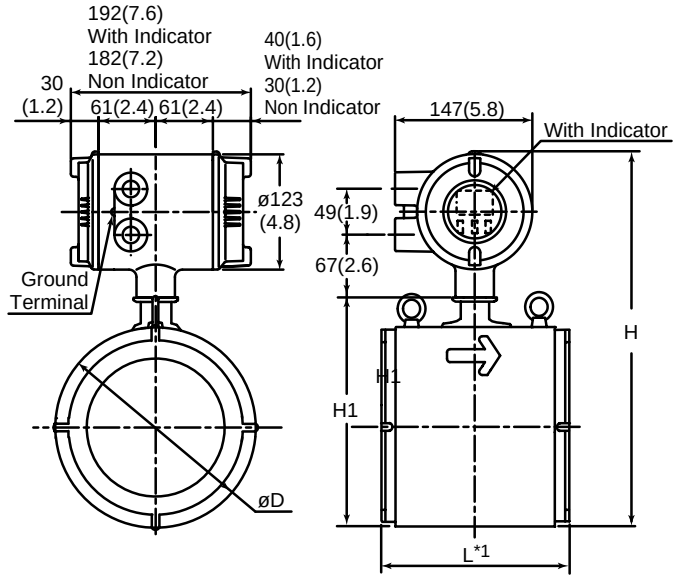
The face to face length is longer by approx. 22 mm (0.87 in) for earth ring(P,T).

The face to face length is longer by approx.8.4mm (0.33 in) for optional code/FRG.

Model		SE202□J	SE204□J	SE205□J	SE208□J	SE210□J
Nominal size		25(1)	40(1.5)	50(2)	80(3)	100(4)
Lining		Fluorocarbon PFA				
Face-to-face length	L*1	60(2.4)	70(2.8)	80(3.1)	120(4.7)	150(5.9)
Outside diameter	øD	67.5(2.7)	86(3.4)	99(3.9)	129(5.1)	155(6.1)
Height	H	240(9.4)	260(10.2)	285(11.2)	307(12.1)	338(13.3)
	H1	84(3.3)	104(4.1)	129(5.1)	156(6.1)	182(7.2)
Weight kg(lb)*2		3.6(7.9)	3.8(8.3)	4.2(9.1)	6.6(14.6)	8.6(19.0)

*2 With Indicator Option: Add 0.22 kg(0.49 lb)

150 mm (6 in) to 200 mm (8 in) Wafer Type



*1 When no earth ring is selected the face to face length is shorter by approx. 2 mm (0.08 in).

The face to face length is longer by approx. 32 mm (1.3 in) for earth ring(P,T).

The face to face length is longer by approx. 10.0mm (0.40in) for optional code/FRG.

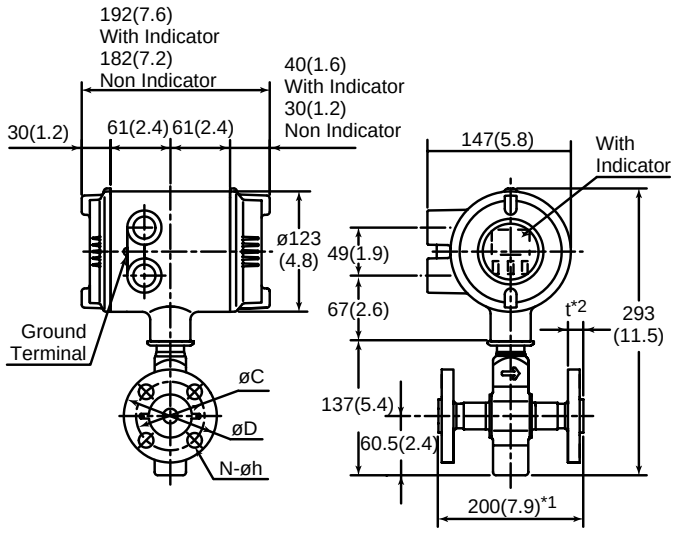
Model		SE215□J	SE220□J
Nominal size		150(6)	200(8)
Lining		Fluorocarbon PFA	
Face-to-face length	L*1	200(7.9)	250(9.8)
Outside diameter	øD	218(8.6)	268(10.6)
Height	H	407(16.0)	457(18.0)
	H1	248(9.8)	298(11.7)
Weight kg(lb)*2		16.1(35.5)	24.2(53.4)

*2 With Indicator Option: Add 0.22 kg(0.49 lb)

F03.EPS

15 mm (0.5 in) Flange Type

Unit : mm(inch)



*1 When no earth ring is selected the face to face length is shorter by approx. 1.6 mm(0.06 in).

The face to face length is longer by approx. 22 mm (0.87 in) for earth ring(P,T).

The face to face length is longer by approx. 8.4 mm (0.33 in) for optional code/FRG.

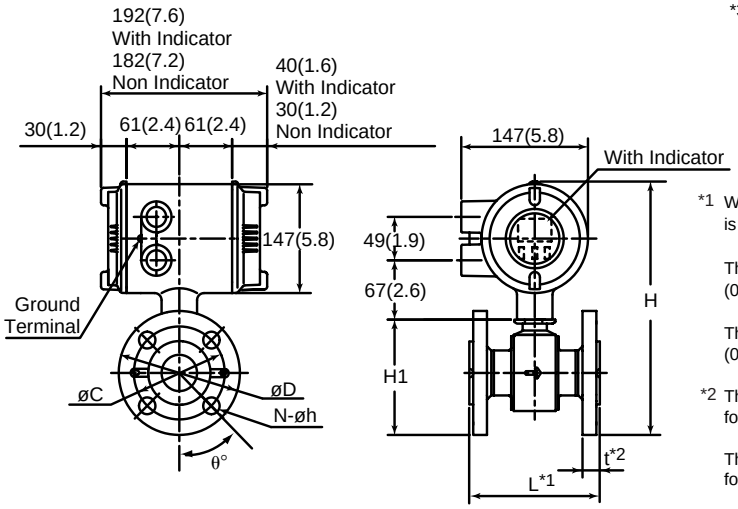
*2 The thickness(t) is longer by approx. 11 mm (0.43 in) for earth ring(P,T).

The thickness(t) is longer by approx. 4.2 mm (0.17 in) for optional code/FRG.

Model		SE115□J				
Nominal size		15(0.5)				
Flange Type		J1□	J2□	A1□	A2□	D4□
Lining		Fluorocarbon PFA				
Flange outside dial.	øD	95 (3.7)	95 (3.7)	88.9 (3.5)	95.3 (3.8)	95 (3.7)
Pitch circle dia.	øC	70 (2.8)	70 (2.8)	60.5 (2.4)	66.5 (2.6)	65 (2.6)
Number of holes	N	4				
Dia. of holes	øh	15 (0.6)	15 (0.6)	15.7 (0.6)	15.7 (0.6)	14 (0.6)
Thickness	t*2	15.8 (0.6)	17.8 (0.7)	15 (0.6)	18 (0.7)	19.8 (0.8)
Weight kg(lb)*3		4.9 (10.7)	5.0 (11.1)	4.6 (10.0)	5.0 (11.0)	4.5 (9.9)

*3 With Indicator Option: Add 0.22 kg(0.49 lb)

25 mm (1 in) to 50 mm (2 in) Flange Type



*1 When no earth ring is selected the face to face length is shorter by approx. 1.6 mm(0.06 in).

The face to face length is longer by approx. 22 mm (0.87 in) for earth ring(P,T).

The face to face length is longer by approx. 8.4 mm (0.33 in) for optional code/FRG.

*2 The thickness(t) is longer by approx. 11 mm (0.43 in) for earth ring(P,T).

The thickness(t) is longer by approx. 4.2 mm (0.17 in) for optional code/FRG.

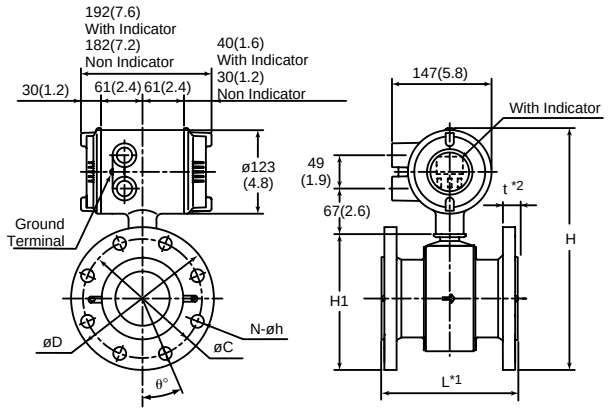
Model		SE202□J					SE204□J					SE205□J				
Nominal size		25(1)					40(1.5)					50(2)				
Flange Type		J1□	J2□	A1□	A2□	D4□	J1□	J2□	A1□	A2□	D4□	J1□	J2□	A1□	A2□	D4□
Lining		Fluorocarbon PFA					Fluorocarbon PFA					Fluorocarbon PFA				
Face to face length (ISO)	L*1	200(7.9)					200(7.9)					200(7.9)				
Flange outside dia.	øD	125 (4.9)	125 (4.9)	108 (4.3)	124 (4.9)	115 (4.5)	140 (5.5)	140 (5.5)	127 (5.0)	155.4 (6.1)	150 (5.9)	155 (6.1)	155 (6.1)	152.4 (6.0)	165.1 (6.5)	165 (6.5)
Height	H	272 (10.7)	272 (10.7)	264 (10.4)	272 (10.7)	267 (10.5)	290 (11.4)	290 (11.4)	284 (11.1)	298 (11.7)	295 (11.6)	316 (12.4)	316 (12.4)	315 (12.4)	321 (12.6)	321 (12.6)
	H1	113 (4.4)	113 (4.4)	105 (4.1)	113 (4.4)	108 (4.3)	131 (5.2)	131 (5.2)	125 (4.9)	139 (5.5)	136 (5.4)	157 (6.2)	157 (6.2)	156 (6.1)	162 (6.4)	162 (6.4)
Pitch circle dia.	øC	90 (3.5)	90 (3.5)	79.2 (3.1)	88.9 (3.5)	85 (3.3)	105 (4.1)	105 (4.1)	98.6 (3.9)	144.3 (5.7)	110 (4.3)	120 (4.7)	120 (4.7)	120.7 (4.8)	127 (5.0)	125 (4.9)
Number of holes	N	4					4					4	8	4	4	4
Dia. of holes	øh	19 (0.7)	19 (0.7)	15.7 (0.6)	19.1 (0.7)	14 (0.6)	19 (0.7)	19 (0.7)	15.7 (0.6)	22.4 (0.9)	18 (0.7)	19 (0.7)	19 (0.7)	19.1 (0.7)	19.1 (0.7)	18 (0.7)
Thickness	t*2	17 (0.7)	19 (0.7)	17.2 (0.7)	20.7 (0.8)	21 (0.8)	19 (0.7)	21 (0.8)	20.5 (0.8)	23.5 (0.9)	21 (0.8)	19 (0.7)	21 (0.8)	22.2 (0.9)	25.2 (1.0)	23 (0.9)
Bolt hole pitch	θ°	45	45	45	45	45	45	45	45	45	45	45	22.5	45	22.5	45
Weight kg(lb)*3		6.0 (13.0)	6.3 (13.9)	5.3 (11.7)	6.5 (14.3)	6.3 (13.9)	7.6 (16.8)	7.9 (17.4)	7.2 (15.9)	9.5 (20.9)	9.2 (20.3)	9.0 (19.8)	9.1 (20.0)	9.5 (20.9)	11.1 (24.5)	10.9 (24.0)

*3 With Indicator Option: Add 0.22 kg(0.49 lb)

F04-1.EPS

80mm (3in) to 100mm (4in) Flange Type

Unit : mm(inch)



*1 When no earth ring is selected the face to face length is shorter by approx. 1.6 mm(0.06 in).

The face to face length is longer by approx. 22 mm (0.87 in) for earth ring(P,T).

The face to face length is longer by approx. 0.84mm (0.33 in) for optional code/FRG.

*2 The thickness(t) is longer by approx. 11 mm (0.43 in) for earth ring(P,T).

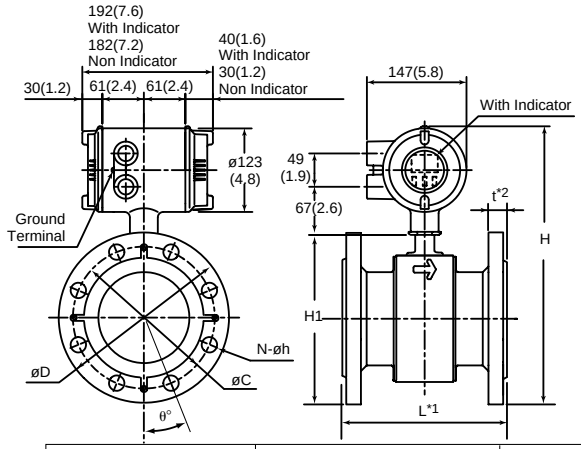
The thickness(t) is longer by approx. 0.42mm (0.17 in) for optional code/FRG.

Model		SE208□J						SE210□J					
Nominal size		80(3)						100(4)					
Flange Type		J1□	J2□	A1□	A2□	D4□	G1□	J1□	J2□	A1□	A2□	D2□	G1□
Lining		PFA Lining						PFA Lining					
Face to face length (ISO)	L*1	200(7.9)						250(9.8)					
Flange outside dia.	øD	185 (7.3)	200 (7.9)	190.5 (7.5)	209.6 (8.3)	200 (7.9)	211 (8.3)	210 (8.3)	255 (8.9)	228.6 (9.1)	254 (10.0)	220 (8.7)	23.8 (9.4)
Height	H	338 (13.3)	346 (13.6)	341 (13.4)	351 (13.8)	346 (13.6)	351 (13.8)	369 (14.5)	376 (14.8)	378 (14.9)	391 (15.4)	374 (14.7)	383 (15.1)
	H1	179 (7.0)	187 (7.4)	182 (7.2)	197 (7.8)	187 (7.4)	192 (7.6)	210 (8.3)	217 (8.5)	219 (8.6)	232 (9.1)	215 (8.5)	224 (8.8)
Pitch circle dia.	øC	150 (5.9)	160 (6.3)	152.4 (6.0)	168.1 (3.5)	160 (6.3)	168 (6.6)	175 (6.9)	185 (7.3)	190.5 (7.5)	200.2 (7.9)	180 (7.1)	195 (7.7)
Number of holes	N	8		4	8		4	8					4
Dia. of holes	øh	19 (0.7)	23 (0.9)	19.1 (0.7)	22.4 (0.9)	18 (0.7)	19 (0.7)	19 (0.7)	23 (0.9)	19.1 (0.7)	22.4 (0.9)	18 (0.7)	19 (0.7)
Thickness	t*2	21.8 (0.9)	25.8 (1.0)	27.7 (0.7)	32.2 (1.3)	23.8 (0.9)	21.8 (0.9)	21.8 (0.9)	27.8 (1.1)	27.7 (1.1)	34.8 (1.4)	23.8 (0.9)	21.8 (0.9)
Bolt hole pitch	θ°	22.5	22.5	45	22.5	22.5	45	22.5	22.5	22.5	22.5	22.5	45
Weight kg(lb)*3		11.7 (25.8)	15.6 (34.3)	16.3 (35.9)	17.6 (38.8)	13.6 (29.9)	14.0 (30.9)	13.7 (30.2)	17.6 (38.7)	18.3 (40.3)	24.8 (54.7)	15.6 (34.3)	26 (57.3)

*3 With Indicator Option: Add 0.22 kg(0.49 lb)

F05.EPS

80mm(3in) to 100mm(4in) Flange Type



*1 When no earth ring is selected the face to face length is shorter by approx. 2 mm (0.08 in).

The face to face length is longer by approx. 32 mm (1.3 in) for earth ring(P,T).

The face to face length is longer by approx. 10.0 mm (0.4 in) for optional code/FRG.

*2 The thickness(t) is longer by approx. 16 mm (0.63 in) for earth ring(P,T).

The thickness(t) is longer by approx. 5.0 mm (0.20 in) for optional code/FRG.

Model		SE215□J						SE220□J						
Nominal size		150(6)						200(8)						
Flange Type		J1□	J2□	A1□	A2□	D2□	G1□	J1□	J2□	A1□	A2□	D1□	D2□	G1□
Lining		PFA Lining						PFA Lining						
Face to face length (ISO)	L*1	300(11.8)						350(13.8)						
Flange outside dia.	øD	280 (11.0)	305 (12.0)	279.4 (11.0)	317.5 (12.5)	285 (11.2)	290 (11.4)	330 (13.0)	350 (13.8)	342..5 (13.5)	381 (15.0)	220 (8.7)	340 (13.4)	342 (13.5)
Height	H	438 (17.2)	450.5 (17.8)	437.7 (17.2)	450.7 (18.0)	440.5 (17.4)	443 (17.4)	488 (19.2)	498 (19.6)	493.4 (19.4)	513.5 (20.2)	493 (14.4)	493 (14.4)	494 (19.4)
	H1	279 (10.7)	291.5 (11.5)	278.7 (11.0)	297.8 (11.7)	281.5 (11.1)	284 (11.2)	329 (13.0)	339 (13.3)	335.5 (13.2)	354.5 (14.0)	334 (13.1)	334 (13.1)	335 (13.2)
Pitch circle dia.	øC	240 (9.4)	260 (10.2)	240 (9.5)	270 (10.6)	240 (9.4)	247 (9.7)	290 (11.4)	305 (12.0)	298.4 (11.7)	330.2 (13.0)	295 (11.6)	295 (11.6)	299 (11.8)
Number of holes	N	8	12	8	12	8	6	12	12	8	12	8	12	8
Dia. of holes	øh	23 (0.9)	25 (1.0)	22.3 (0.9)	22.3 (0.9)	22 (0.9)	19 (0.7)	23 (0.9)	25 (1.0)	22.3 (0.9)	25.4 (1.0)	22 (0.9)	22 (0.9)	19 (0.7)
Thickness	t*2	27 (1.1)	33 (1.3)	30.4 (1.2)	41.5 (1.2)	27 (1.1)	27 (1.1)	27 (1.1)	35 (1.4)	49.4 (1.9)	46.1 (1.8)	29 (1.1)	29 (1.1)	29 (1.1)
Bolt hole pitch	θ°	22.5	15	22.5	15	22.5	30	15	15	22.5	15	22.5	15	22.5
Weight kg(lb)*3		28 (64.7)	35 (77.2)	30 (66.1)	45 (99.2)	30 (66.1)	29 (64.0)	39 (86)	49 (108)	46 (101)	68 (149.9)	43 (94.8)	44 (97.0)	45 (99.3)

*3 With Indicator Option: Add 0.22 kg(0.49 lb)

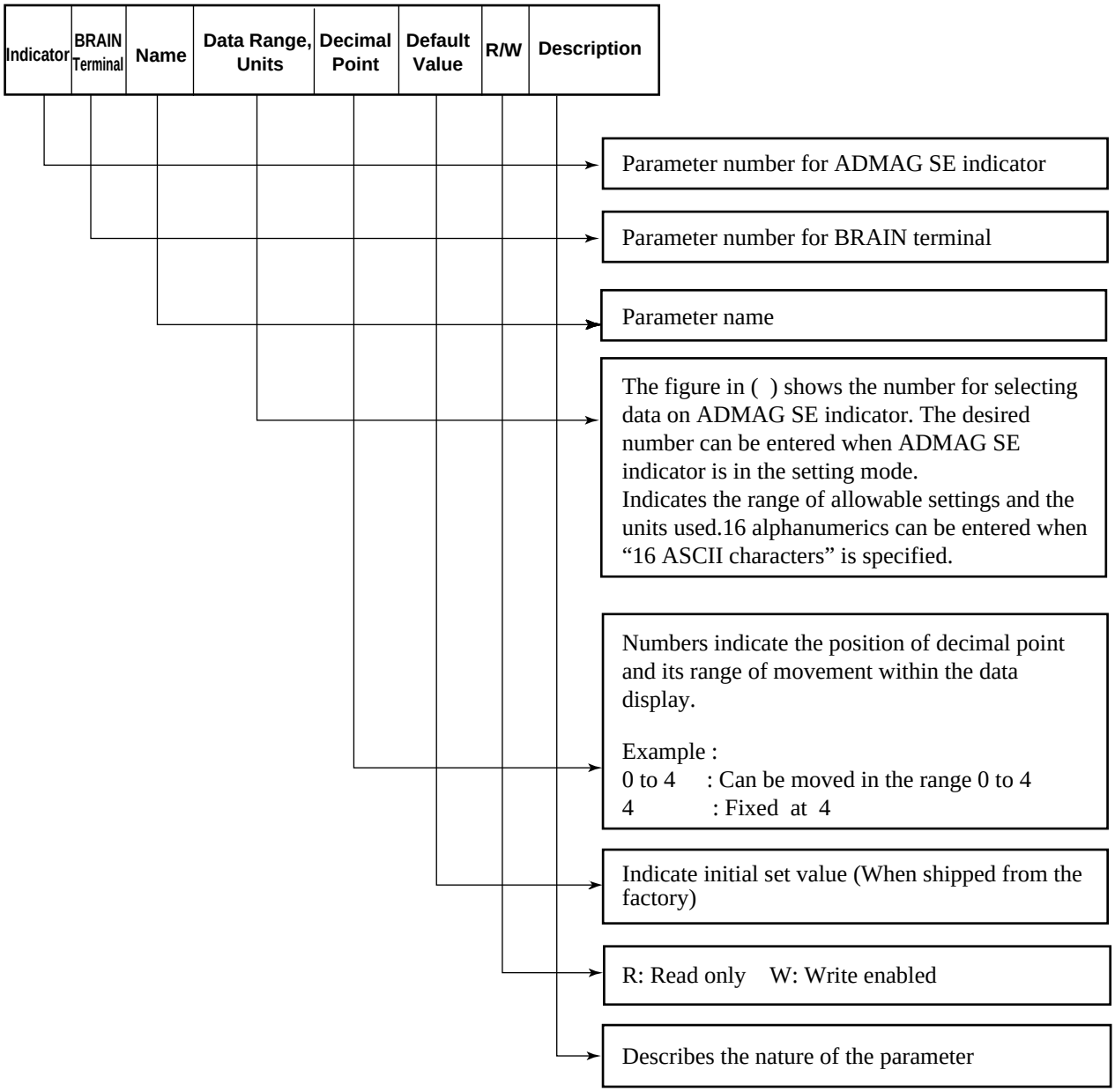
F05-1.EPS

11. PARAMETER LIST

11.1 Parameters for ADMAG SE Indicator and BRAIN Terminal

This chapter describes ADMAG SE parameters for its indicator and BRAIN Terminal.

● **Description of Items**



List of Parameters for ADMAG SE Indicator and BRAIN Terminal

Indicator	BRAIN Terminal	Name	Data Range, Units	Decimal Point	Default Value	R/W	Description
—	A00	DISPLAY				R	Major outputs display functions.
A10	A10	FLOW RATE(%)	–10.0 to 110.0%	1		R	Displays instantaneous flow rate in %.
A20	A20	FLOW RATE	±300.0	0 to 4		R	Displays instantaneous flow rate in egineering unit.
A30	A30	TOTAL	0 to 999999	0		W	Displays and presets forward direction totalized flow rate.
A31	A31	REV.TOTAL	0 to 999999			W	Displays and resets reverse direction totalized flow rate.
A32	A32	DIF.TORAL	–999999 to 999999			R	Displays differential totalized flow rate between forward and reverse. (A32=A30–A31)
—	A60	SELF CHECK	GOOD ERROR µF FAULT EEPROM FAULT A/D FAULT SIGNAL OVERFLOW COIL OPEN SPAN VEL.> 10 m/s SPAN VEL.< 0.3 m/s P.SPAN > 1000 p/s P.SPAN > 500 p/s P.SPAN > 25 p/s P.SPAN > 15 p/s P.SPAN > 10 p/s P.SPAN > 5 p/s P.SPAN < 0001 p/s T.SPAN > 1000 p/s T.SPAN < 0001 p/s 4 - 20 LMT ERROR EMPTY PIPE MULTIRANGE ERROR COIL SHORT EEPROM NO SET EEPROM DEFAULT			R	Displays self-check result. See “8.2 Self-diagnostics Functions.”

Indicator	BRAIN Terminal	Name	Data Range, Units	Decimal Point	Default Value	R/W	Description
—	B00	SET				R	Major parameter setting.
—	B01	TAG NO.	ASC II 16 characters			W	Sets tag no. up to 16 characters.
b02	B02	DAMPING	0.5 to 200 sec	1	3.0	W	Sets damping time constant of output.
b03	B03	FLOW SPAN	1 to 3.0000	0 to 4	1.0000	W	Sets flow span in selected unit.
b04	B04	FLOW UNIT	(00) $km^3(10^3 \times m^3)$ (01) m^3 (02) l(liter) (03) $cm^3(10^{-2} \times m)^3$ (04) M gal (05) k gal (06) gal (07) m gal (08) k bbl (09) bbl (10) m bbl (11) µ bbl (12) m (13) ft		m	W	Selects volume unit of flow span.
b05	B05	TIME UNIT	(00) / d (01) / h (02) / m (03) / s		/ s	W	Selects time unit of flow span.
b06	B06	SIZE UNIT	(00) mm (01) inch		mm	W	Selects flow tube nominal size unit.
b07	B07	NOMINAL SIZE	1 to 3000.0	1	100.0	W	Sets flow tube nominal size in selected unit.
b08	B08	MF	0.2500 to 3.0000		1.000	W	Sets meter factor. (Actual flow test data has been entered.)
b10	B10	OUTPUT FUNC	(00) PULSE OUT (01) ALARM OUT (02) BI DIRECTION (03) AUTO 2 RANGES (04) LOW ALARM (05) TOTAL SWITCH		PULSE OUT	W	Selects status output functions.
b11	B11	4 - 20 ALM OUT	(00) 2.4 mA OR LESS (01) 4.0 mA (02) HOLD (03) 21.6 mA OR MORE		21.6 mA OR MORE	W	Selects current output during alarm occurrence.
b12	B12	POWER FREQ	47.00 to 63.00 Hz	2	50.00	W	Sets AC power frequency for DC power supply.

Indicator	BRAIN Terminal	Name	Data Range, Units	Decimal Point	Default Value	R/W	Description
b13	B13	VELOCITY CHK	0 to 32.767 m/s	3		R	Displays span in m/s.
b14	B14	FLOW DIR	(00) FORWARD (01) REVERSE		FORWARD	W	Selects flow direction.
b30	B30	REV.SPAN	1 to 3.0000	0 to 4	1.0000	W	Sets span for reverse direction.
b31	B31	BI DIREC HYS	0 to 10%		2	W	Sets hysteresis when change in flow direction.
b33	B33	FOR.SPAN2	1 to 3.0000	0 to 4	1.0000	W	Sets the second span for forward direction.
b34	B34	AUTO RNG HYS	0 to 15%		10	W	Sets hysteresis when change in Auto 2 ranges.
b36	B36	LOW ALARM	–10 to 110%		–10	W	Sets low limit alarm.
b37	B37	L. ALARM HYS	0 to 15%		5	W	Sets hysteresis for low limit alarm.
—	B60	SELF CHECK	GOOD to EEPROM DEFAULT			R	Displays self-check result.
—	C00	ADJUST				R	Automatic zero adjustment functions.
C01	C01	ZERO TUNING	(00) INHIBIT (01) ENABLE		ENABLE	W	Inhibits or enables automatic zero adjustment.
C02	C02	MAGFLOW ZERO	0 to ±99.99	2	0.00	W	Excecutes automatic zero adjustment and displays zero correction value.
—	C60	SELF CHECK	GOOD to EEPROM DEFAULT			R	Displays self-check result.
—	D00	DISP SEL				R	Display functions.
d01	D01	DISP SELECT	(00) RATE(%) (01) RATE (02) FOR. TOTAL (03) REV. TOTAL (04) DIF. TOTAL (05) RATE(%) / FOR. TTL (06) RATE / FOR. TTL (07) RATE / RATE(%) (08) RATE(%) / REV. TTL (09) RATE / REV. TTL (10) RATE(%) / DIF.TTL (11) RATE / DIF.TTL		RATE(%)	W	Selects display items on flowmeter indicator.
d02	D02	FL USER SEL	(00) NOT PROVIDED (01) PROVIDED		NOT PROVIDED	W	Selects whether “PV” is displayed with user-defined unit.
d03	D03	FL USER SPAN	0 to 3000	0 to 4	100	W	Sets value displayed in “PV” at 100% output when “Fl user sel” is provided.
—	D10	FL USER UNIT		ASCII 8 characters		W	Sets user-defined unit displayed in “A20.”
—	D60	SELF CHECK	GOOD to EEPROM DEFAULT			R	Displays self-check result.

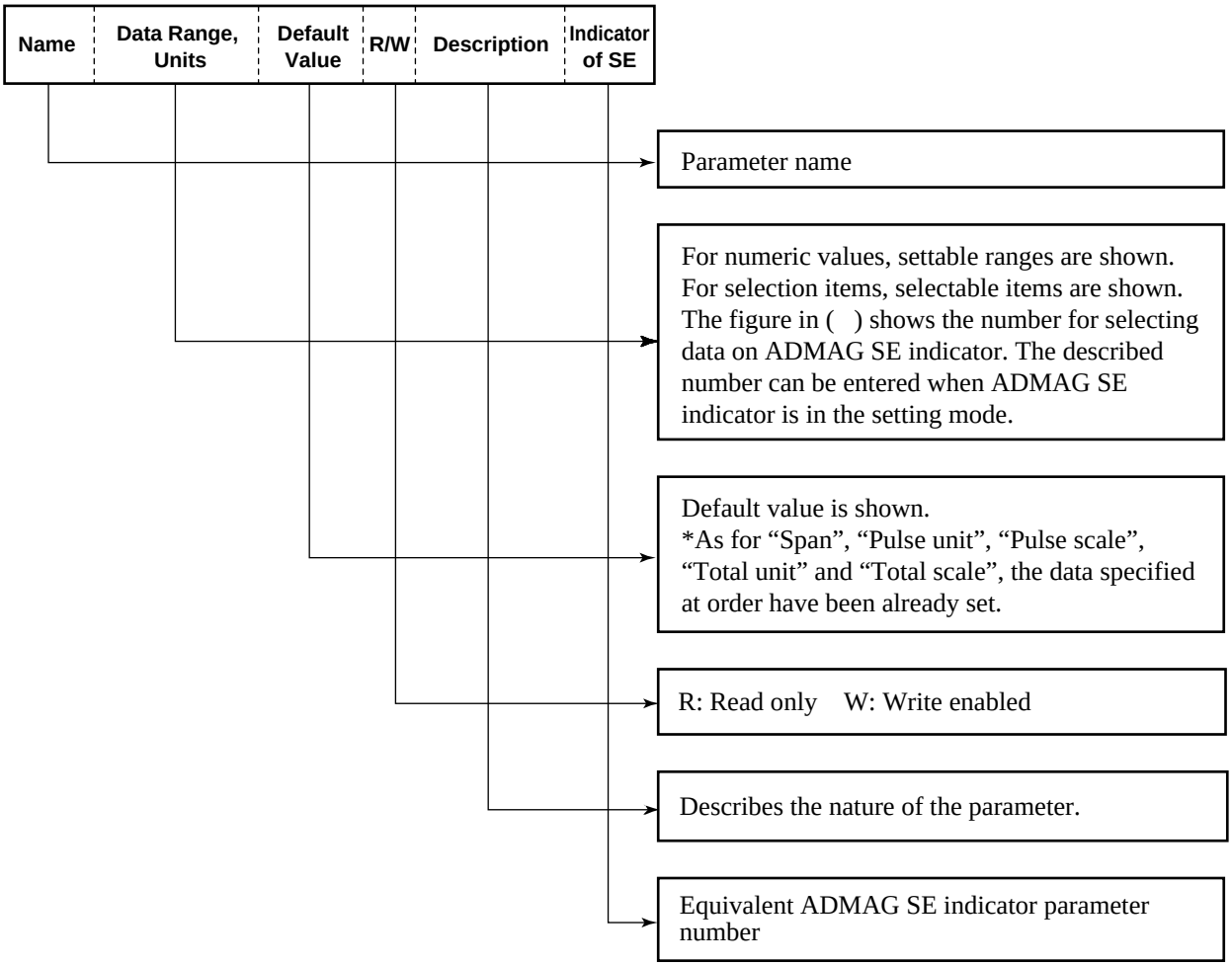
Indicator	BRAIN Terminal	Name	Data Range, Units	Decimal Point	Default Value	R/W	Description
—	E00	TOTAL SET				R	Totalization functions.
E01	E01	TOTAL UNIT	(00) n UNIT / P (01) μ UNIT / P (02) m UNIT / P (03) UNIT / P (04) k UNIT / P (05) M UNIT / P (06) PULSE / s		PULSE/s		Selects totalization rate unit. (“UNIT” in the selection on the left represents the “Base vol unit” selected.)
E02	E02	TOTAL SCALE	0 to 3.0000	0 to 4	0	W	Sets totalization rate.
E03	E03	TOTAL LOWCUT	0 to 100%		3	W	Sets low cut width of totalization.
E04	E04	TOTAL SET	(00) INHIBIT (01) ENABLE		INHIBIT	W	Inhibits or enables forward direction totalization and reverse direction totalization from being preset and reset, respectively.
E05	E05	TL SET VALUE	0 to 999999		0	W	Sets forward direction totalization present value.
E06	E06	TOTAL SWITCH	0 to 999999		0	W	Set switching level when using status output function as totalization switch function.
—	E10	TL USER UNIT	ASCII 8 characters			W	Sets user-defined unit displayed in “A30.”
—	E60	SELF CHECK	GOOD to EEPROM DEFAULT			R	Displays self-check result.
—	F00	PULSE SET				R	Pulse output functions.
F01	F01	PULSE UNIT	(00) n UNIT / P (01) μ UNIT / P (02) m UNIT / P (03) UNIT / P (04) k UNIT / P (05) M UNIT / P (06) PULSE / s		PULSE/s	W	Selects pulse rate unit. (“UNIT” in the selection on the left represents the “Base vol unit” selected.)
F02	F02	PULSE SCALE	0 to 30000	0 to 4	0	W	Sets pulse rate.
F03	F03	PULSE LOWCUT	0 to 100%		3	W	Sets low cut width of pulse output.
F04	F04	PULSE WIDTH	(00) 50% DUTY (01) 0.5 ms (02) 1 ms (03) 20 ms (04) 33 ms (05) 50 ms (06) 100 ms		50% DUTY	W	Selects pulse width.
—	F60	SELF CHECK	GOOD to EEPROM DEFAULT			R	Displays self-check result.

Indicator	BRAIN Terminal	Name	Data Range, Units	Decimal Point	Default Value	R/W	Description
—	G00	4 - 20 SET				R	Current output functions.
G01	G01	4 - 20 LOW CUT	0 to 10%		0	W	Sets low cut width of current output.
G02	G02	4 - 20 LOW LMT	–20 to 100%		–20	W	Sets low limit of current output.
G03	G03	4 - 20 H LMT	0 to 120%		120	W	Sets high limit of current output.
—	G60	SELF CHECK	GOOD to EEPROM DEFAULT			R	Displays self-check result.
—	H00	TEST				R	Output circuit test mode.
H01	H01	TEST MODE	(00) NORMAL (01) TEST		NORMAL	W	Selects test mode.
H02	H02	OUTPUT VALUE	–108 to 108		0	W	Sets test output value.
H03	H03	STATUS OUT	(00) NROMAL (01) CLOSED (ON) (02) OPEN (OFF)		NORMAL	W	Selects test status output.
—	H60	SELF CHECK	GOOD to EEPROM DEFAULT			R	Displays self-check result.
—	L00	OTHER				R	Data setting restriction functions.
L01	L01	TUNING	(00) INHIBIT (01) ENABLE		ENABLE	W	Inhibits or enables data setting with indicator switches or BT200.
L02	L02	KEY	00 55 << TO “N” >>		0	W	Enables “N” items display. Sets “55” for access to “N” items.
—	L60	SELF CHECK	GOOD to EEPROM DEFAULT			R	Displays self-check result.
—	N00	APPL SET					Special application.
n01	N01	TOTAL / PULSE	(00) NO DAMP (01) DAMP		DAMP	W	Selects whether instantaneous flow rate values or damped ones are used for totalization and pulse output.
n02	N02	OUTPUT MODE	(00) ON (01) OFF		ON	W	Selects active level of status output set in “B10.” (except “ALARM OUT”)
n03	N03	RATE LIMIT	0 to 10%		5	W	Sets the level to reduce output fluctuation.
n04	N04	DEAD TIME	0 to 15 s		0	W	Sets dead time to reduce output fluctuation. When “0” is set, “Rate limit” is not available.
n05	N05	POWER SYNCH	(00) YES (01) NO		YES	W	Selects synchronization between excitation frequency and power frequency.
n07	N07	EMPTY PIPE	(00) ALARM (01) NO ALARM		NO ALARM	W	Selects alarm effectiveness when flow tube is not filled with fluid.
—	N60	SELF CHECK	GOOD to EEPROM DEFAULT				Displays self-check result.

11.2 Parameters for HART Communicator

This chapter describes ADMAG SE parameters for HART Communicator. Note the differences between parameters on ADMAG SE indicator and those on HART Communicator.

● **Description of Items**



List of Parameters for HART Communicator

Name	Data Range, Units	Default Value	R/W	Description	Indicator of SE
PV	–32400 to 32400		R	Displays instantaneous flow rate in engineering unit.	A20
Totl	0 to 999999	0	W	Displays and presets forward direction totalized flow rate.	A30
PV AO	2.40 to 21.6 mA		R	Displays current output.	—
Span	0.0001 to 30000	1.0000	W	Sets flow span in selected unit.	b03
Status group 1	Error µP fault EEPROM fault A/D fault Signal overflow Coil open Vel. span> 10 m/s Vel. span< 0.3 m/s		R	Displays self-diagnostics result. “ON” shows error status. “OFF” shows normal status. See “8.2 Self-diagnostics Functions.”	—
Status group 2	P. span> 1000p/s P. span> 500p/s P. span> 25p/s P. span> 15p/s P. span> 10p/s P. span> 5p/s P. span< .0001p/s T. span> 1000p/s		R	Ditto	—
Status group 3	T. span< .0001p/s Analog lmt error Empty pipe Multi range err Coil short EEPROM no set EEPROM default Dev id not entered		R	Ditto	—
Self test	—	—	W	Excecutes self-diagnostics.	—
Auto zero	—	—	W	Executes automatic zero adjustment.	C02
Zero tuning	(00) Inhibit (01) Enable	Enable	W	Inhibits or enables automatic zero adjustment.	C01
D/A trim	ZERO: 3.2 to 5.6 mA SPAN: 18.4 to 21.6 mA		W	Performs fine adjustments of zero and span of current output.	—
Scaled D/A trim	ZERO: 3.2 to 5.6 mA SPAN: 18.4 to 21.6 mA		W	Performs fine adjustments of zero and span of scaled analog output.	—
Loop test	4 mA 20 mA Other (2.72 to 21.28 mA) End	4 mA	W	Sets test output value.	H02
Status out	(00) Normal (01) Closed (on) (02) Open (off)	Normal	W	Selects test status output.	H03
PV Unit	gal/min L/min Cum/h ft/s m/s (Spcl)	m/s	W	Selects engineering unit of “PV”. Displays “Spcl” in case of setting unit except 5 units on the left.	—

Name	Data Range, Units	Default Value	R/W	Description	Indicator of SE
Line size	0.01 to 300.0 mm/inch	100.0	W	Sets flow tube nominal size in selected unit.	b07
PV Damp	0.05 to 200.0 sec.	3.0	W	Sets damping time constant of output.	b02
Tag	Enter characters	—	W	Sets tag no. up to 8 characters.	—
Descriptor	Enter characters	—	W	Sets user-defined characters up to 16.	—
Message	Enter characters	—	W	Sets user-defined characters up to 32.	—
Date	01/01/00 to 12/31/99	0	W	Sets month/day/year.	—
Base bol unit	(00) k Cum (01) Cum (02) L (03) Cucm (04) M gal (05) k gal (06) gal (07) m gal (08) k bbl (09) bbl (10) m bbl (11) u bbl (12) m (13) ft	m	W	Selects volume unit of flow span.	b04
Base time unit	(00) d (01) h (02) min (03) s	s	W	Selects time unit of flow span.	b05
Velocity check	0 to 32.767 m/s		R	Displays span in m/s.	b13
Size unit	(00) mm (01) in	mm	W	Selects flow tube nominal size unit.	b06
MF	0.2500 to 3.0000	1.0000	W	Sets meter factor. (Actual flow test data has been entered.)	b08
Flow dir	(00) Forward (01) Reverse	Forward	W	Selects flow direction.	b14
PV % rnge	–110.0 to 110.0%		R	Displays instantaneous flow rate in %.	A10
Rate limit	0 to 10%	5	W	Sets the level to reduce output fluctuation.	n03
Dead time	0 to 15 sec	0	W	Sets the dead time to reduce output fluctuation. When “0” is set, “Rate limit” is not available.	n04
Power synch	(00) Yes (01) No	Yes	W	Selects synchronization between excitation frequency and power frequency.	n05
Power freq	47.00 to 63.00 Hz	50.00	W	Sets AC power frequency for DC power supply.	b12
Total unit	(00) n UNIT/P (01) u UNIT/P (02) m UNIT/P (03) UNIT/P (04) k UNIT/P (05) M UNIT/P (06) PULSE/s	PULSE/s	W	Selects totalization rate unit. (“UNIT” in the selection on the left represents the “Base vol unit” selected.)	E01
Total scale	0.0000 to 30000	0	W	Sets totalization rate.	E02
Total low cut	0 to 100%	3	W	Sets low cut width of totalization.	E03

Name	Data Range, Units	Default Value	R/W	Description	Indicator of SE
Tl set value	0 to 999999	0	W	Sets forward direction totalization preset value.	E05
Total set	(00) Inhibit (01) Enable	Inhibit	W	Inhibits or enables forward direction totalization and reverse direction totalization from being preset and reset, respectively.	E04
Total switch	0 to 999999	0	W	Sets switching level when using status output function as totalization switch function.	E06
Reverse total	0 to 999999	0	W	Displays and resets reverse direction totalizaed flow rate.	A31
Diff. total	–999999 to 999999	0	R	Displays differential totalized flow rate between forward and reverse. (Diff. total = Totl – Reverse total)	A32
Analog low cut	0 to 10%	0	W	Sets low cut width of current output.	G01
Analog low lmt	–20 to 100%	–20	W	Sets low limit of current output.	G02
Analog hi lmt	0 to 120%	120	W	Sets high limit of current output.	G03
PV AO Alrm typ	—	Hi	R	Displays burn out direction of current output.	—
Analog alarm out	(00) 2.4 mA or less (01) 4.0 mA (02) Hold (03) 21.6 mA or more	21.6 mA or more	W	Selects current output during alarm occurrentce.	b11
Poll addr	0 to 15	0	W	Sets polling address when multidrop mode.	—
Num req preams	5	5	R	Displays number of request preambles.	—
Burst mode	Off On	Off	W	Selects the mode for the burst mode functionality.	—
Burst option	PV % range/current Process vars/crnt	PV	W	Selects sending items (instantaneous flow rate, output in %, totalization value and/or current output) when burst mode.	—
Output function	(00) Pulse out (01) Alarm out (02) Bi direction (03) Auto 2 ranges (04) Low alarm (05) Total switch	Pulse out	W	Selects status output functions.	b10
Reverse span	0.0001 to 30000	1.0000	W	Sets span for reverse direction.	b30
Bi direction hys	0 to 10%	2	W	Sets hysteresis when change in flow direction.	b31
Forward span2	0.0001 to 30000	1.0000	W	Sets the second span for forward direction.	b33
Auto range hys	0 to 15%	10	W	Sets hysteresis when change in Auto 2 ranges.	b34
Low alarm	–10 to 110%	–10	W	Sets low limit alarm.	b36
Low alarm hys	0 to 10%	5	W	Sets hysteresis for low limit alarm.	b37
Pulse unit	(00) n UNIT/P (01) u UNIT/P (02) m UNIT/P (03) UNIT/P (04) k UNIT/P (05) M UNIT/P (06) PULSE/s	PULSE/s	W	Selects pulse rate unit. (“UNIT” in the selection on the left represents the “Base vol unit” selected.)	F01

Name	Data Range, Units	Default Value	R/W	Description	Indicator of SE
Pulse scale	0.0000 to 30000	0	W	Sets pulse rate.	F02
Pulse low cut	0 to 100%	3	W	Sets low cut width of pulse output.	F03
Pulse width	(00) 50% Duty (01) 0.5 ms (02) 1 ms (03) 20 ms (04) 33 ms (05) 50 ms (06) 100 ms	50% Duty	W	Selects pulse width.	F04
Disp select	(00) PV % rnge (01) PV (02) Totl (03) Rev. totl (04) Diff. totl (05) PV %rnge/Totl (06) PV/Totl (07) PV %rnge/PV (08) PV %rnge/Rev.totl (09) PV/Rev.totl (10) PV %rnge/Diff.totl (11) PV/Diff.totl	PV% rnge	W	Selects display items on flowmeter indicator.	d01
Fl user sel	(00) Not provided (01) Provided	Not provided	W	Selects whether PV is displayed with user-defined unit.	d02
Fl user span	0 to 30000	100	W	Sets value dsiplayed in “PV” at 100% output when “Fl user sel” is provided.	d03
Total/pulse	(00) No damp (01) Damp	Damp	W	Selects whether instantaneous flow rate values or damped ones are used for totalization and pulse output.	n01
Output mode	(00) On active (01) Off active	On active	W	Selects active level of status output set in “Output function” (except “Alarm out”).	n02
Empty pipe	(00) Alarm (01) No alarm	No alarm	W	Selects alarm effectiveness when flow tube is not filled with fluid.	n07
Manufacturer	Yokogawa	Yokogawa	R	Displays “Yokogawa’.	—
Dev id	—	Its own ID No.	R	Displays device ID.	—
Write protect	Yes No	No	R	Displays status of “Write Protect”.	—
Universal rev	—	—	R	Displays version of universal commands.	—
Fld dev rev	—	—	R	Displays version of communication commands for field device.	—
Software rev	—	—	R	Displays version of software for field device.	—
Enable wrt 10min	Enter characters	—	W	Release write protection when the password set in “New Password” is entered.	—
New password	Enter characters	—	W	Sets new password up to 8 characters.	—
Software seal	(00) Keep (01) Break	Keep	R	Displays software seal status.	—

12. EXPLOSION PROTECTED TYPE INSTRUMENT

In this section, further requirements and differences for explosion proof type instrument are described. For explosion proof type instrument, the description in this chapter is prior to other description in this User's Manual.

NOTE

The terminal box cover and display cover is locked by special screw. In case of opening the cover, please use the Hexagonal Wrench attached.

CAUTION

Be sure to lock the cover with the special screw using the Hexagonal Wrench attached after tightening the cover.

12.1 CENELEC ATEX(KEMA)

WARNING

Only trained persons use this instrument in industrial locations.

(1) Technical Data

No. KEMA 98ATEX3230
Type of Protection : EEx dIIC T6; Group II
Category 2 G
Electrode Circuit Um : 250V ac/dc
Excitation Circuit : 41Vmax. 6/6.25Hz

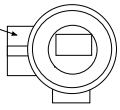
Temp. Class	T6	T5	T4	T3
Process Temp.	70	85	120	130℃

Enclosure : IP67

(2) Electrical Connection

The type of electrical connection is stamped near the electrical connection port according to the following codes.

Screw Size	Marking
ISO M20x1.5 female	⚠ M
ANSI 1/2NPT female	⚠ A
DIN Pg13.5 female	⚠ D



(3) Installation

WARNING

- All wiring shall comply with local installation requirements and local electrical code.
- In hazadous locations, the cable entry devices shall be of a certified flameproof type, suitable for the conditions of use and correctly installed.
- Unused apertures shall be closed with suitable flameproof certified blanking elements. (The plug attached is flameproof certified.)

(4) Operation

WARNING

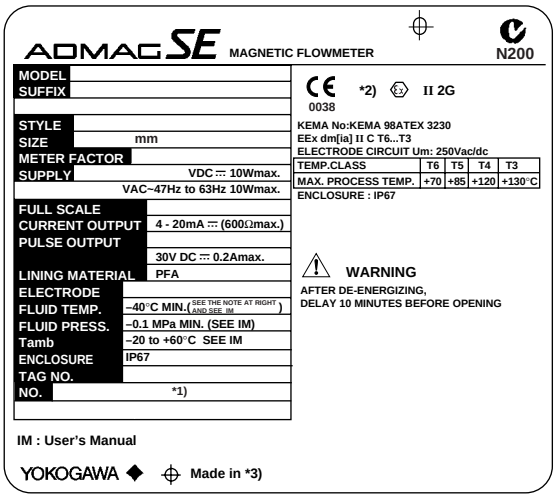
- Wait 10 min. after power is turned off, before opening the covers.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(5) Maintenance and Repair

WARNING

The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void the certification.

(6) Data Plate



MODEL : Specified model code
SUFFIX : Suffix codes of the model code
STYLE : Specified style code
SIZE : Nominal size of apparatus
METER FACTOR : Sensor constant number of apparatus
SUPPLY : Power supply voltage of apparatus
FULL SCALE : Meter range
CURRENT OUTPUT : Output signal of apparatus
PULSE OUTPUT : Output signal of apparatus
LINING MATERIAL : Material of liner
ELECTRODE : Material of Electrode
FLUIDTEMP. : Fluid temperature of apparatus
FLUIDPRESS : Fluid pressure of apparatus
Tamb : Ambient temperature
ENCLOSURE : Enclosure protection number
TAG NO. : Tag number
NO. : Manufacturing serial number
CE : CE marking
ExII 2G : Group II Catergory 2 Gas atmosphere
KEMA No. : KEMA 98ATEX3230 : Certificate number
EExdem[ia]IICT6...T3 : Protection type and temp. class
ELECTRODE CIRCUIT Um : Voltage of electrode circuit
⚠ **WARNING** : Warning to apparatus
IM : User's Manual
YOKOGAWA ◆ : Name and address of manufacturer

*1) The third figure from the last shows the last one figure of the year of production. For example, the year of production of the product engraved as follows is year 1998.

No. F261GA091 813
↑
Produced in 1998

*2) The identification number of the notified body : 0344

*3) The product-producing country

12.2 FM

(1) Technical Data

Explosionproof for Class I Division 1 Groups A, B, C and D. Dust-ignitionproof for Class II/III Division 1 Groups E, F and G. Leads factory sealed.
Intrinsically safe (electrode) for Class I Division 1 Groups A, B, C & D
Electrode Circuit Vmax : 250V ac/dc

Temperature Code	Maximum Ambient Temperature	Maximum Process Temperature	Minimum Process Temperature
T6	+60˚C	+70˚C	-40˚C
T5	+60˚C	+85˚C	-40˚C
T4	+60˚C	+120˚C	-40˚C
T3	+60˚C	+130˚C	-40˚C

Enclosure : NEMA 4X
Ambient Temperature : -20 to +60°C
Maximum Working Pressure : 4MPa(SE115N to SE205N), 2MPa(SE208N to SE220N)
Flange rating should be also considered.

(2) Wiring

⚠ **WARNING**

- All wiring shall comply with National Electrical Code ANSI/NFPA 70 and local electrical code.
- There is no need of conduit seal for both of Division 1 and Division 2 hazardous locations because this product is sealed at factory.

(3) Operation

⚠ **WARNING**

- OPEN CIRCUIT BEFORE REMOVING COVER. INSTALL IN ACCORDANCE WITH THE INSTRUCTION MANNUAL IM1E10B0-01E.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(4) Maintenance and Repair

⚠ **WARNING**

The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void the approval of Factory Mutual Research Corporation.

12.3 CSA

(1) Technical Data

Class I, Groups B, C and D; Class II, Groups E, F and G; Class III; Encl Type 4X
Electrodes: Intrinsically Safe, Ex ia, Class I, Groups A, B, C and D
When installed in Class I, Division 2 locations - Seals No Required.
Electrode Circuit Vmax : 250V ac/dc
Excitation Circuit : 41V max. 6/6.25Hz

Temperature Code	Maximum Ambient Temperature	Maximum Process Temperature	Minimum Process Temperature
T6	+60˚C	+70˚C	-40˚C
T5	+60˚C	+85˚C	-40˚C
T4	+60˚C	+120˚C	-40˚C
T3	+60˚C	+130˚C	-40˚C

Ambient Temperature : -20 to +60°C
Maximum Working Pressure : 4MPa(SE115N to SE205N), 2MPa(SE208N to SE220N)
Flange rating should be also considered.

(2) Wiring

WARNING

All wiring shall comply with Canadian Electrical Code Part I and Local Electrical Codes.
Note a warning label worded as follows.

Warning : A SEAL SHALL BE INSTALLED WITHIN 50cm OF THE ENCLOSURE.
UN SCELLEMENT DOIT ÉTRE INSTALLÉ À MOINS DE 50cm DU BOÎTIER.

When installed in Class I, Division 2, “SEALS NO REQUITED.”

(3) Operation

WARNING

Note a warning label worded as follows.

Warning : OPEN CIRCUIT BEFORE REMOVING COVER.
OUVRIR LE CIRCUIT AVANT D’EN LEVER LE COUVERCLE.

Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(4) Maintenance and Repair

WARNING

The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void CSA Explosionproof Certification.

12.4 SAA

(1) Technical Data

SA Certificate No.: AUS EX 3764X
Type of Protection : Ex d m ia II C T6...T3
Enclosure Type : IP67
Excitation Circuit : 41V max. 6/6.25Hz
Electrode Circuit Um: 250V ac/dc

Temperature Code	Maximum Ambient Temperature	Maximum Process Temperature	Minimum Process Temperature
T6	+60˚C	+70˚C	-40˚C
T5	+60˚C	+85˚C	-40˚C
T4	+60˚C	+120˚C	-40˚C
T3	+60˚C	+130˚C	-40˚C

Ambient Temperature : -20 to +60°C

(2) Installation

WARNING

- All wiring shall comply with local installation requirements and local electrical code.
- In hazardous locations, the cable entry devices shall be of a certified flameproof type, suitable for the contidions of use and correctrly installed.

(3) Operation

WARNING

- Open circuit before opening the covers.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(4) Maintenance and Repair

WARNING

The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void the certification.

13. PRESSURE EQUIPMENT DIRECTIVE

This chapter is described further requirements and notices concerning the PED (Pressure Equipment Directive). The description in this chapter is prior to other description in this User's Manual.

(1) Technical Data

Module : H
Type of Equipment : Piping
Type of Fluid : Liquid and Gas
Group of Fluid : 1 and 2

Model	DN(mm)*	PS(MPa)*	PS-DN(MPa-mm)	CATEGORY**
SE115M/N	15	4	60	Article 3,*** paragraph 3
SE202M/N	25	4	100	
SE204M/N	40	4	160	II
SE205M/N	50	4	200	II
SE208M/N	80	2	160	II
SE210M/N	100	2	200	II
SE215M/N	150	2	300	II
SE220M/N	200	2	400	III

* PS: Maximum allowable pressure for Flow Tube
DN: Nominal size

** Referred to Table 6 covered by ANNEX II of EC Directive on Pressure Equipment Directive 97/23/EC)

*** SE115M/N and SE202M/N are not attached CE mark of PED because they do not come under CE marking of PED.

(2) Installation

WARNING

- Please tighten the bolts for piping-joint according to the prescribed torque values.
- Please take measure to protect the flowmeters from forces caused by vibration through piping.

(3) Operation

WARNING

- The temperature and pressure of fluid should be applied under the normal operating condition.
- The ambient temperature should be applied under the normal operating condition.
- Please pay attention to prevent the excessive pressure like water hammer, etc. When water hammer is to be occurred, please take measures to prevent the pressure from exceeding PS(maximum allowable pressure) by setting the safety valve, etc. at the system and the like.
- When external fire is to be occurred, please take safety measures at the device or system not to influence the flowmeters.
- Please avoid the fluid exceeding the corrosion proof of lining and electrode.
- Please pay attention not to be abrade the metal pipe, when the fluid to abrade the lining such as slurry and sand are contained.